Approved For Release 2000/04/14 : CIA-RDP78-03948A000100050001-2

OCS AUDIT

by

STATINTL [redacted]

2 November 1972

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ATTACHMENTS

1. Physical Facilities and Housekeeping Details
2. Equipment Interconnection Details
3. Computer Software Details
4. Operational Procedures Detail
5. Manager Skills and Personality Details
6. Vendor Relations Details
7. Policy and Standards Details
8. Staffing Detail
9. Security Notes
10. Future Notes
11. How to Tune an Organization

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STATINTL

Copy #5

[redacted]

2 November 1972

Mr. John D. Iams
Director of Computer Services
Central Intelligence Agency
Washington, D. C. 20505

Dear Jack:

This is a report summarizing my two-week audit of your Computer Center. There will be ten attachments to support this summary, one detailing my findings in the ten areas noted and suggesting solutions for the problems I found. In summary, I'm greatly dismayed because I thought you were in much better shape than I found you to be.

The complexity in the computer facility exceeds the capability of the incumbent managers at all levels. The rate of change in the computer center exceeds the capacity of the staff to keep up. After meeting about 50 of your employees, I did not find a single one who was professionally comfortable in the face of foreseeable problems. The pace is rushed, the staff is over-worked, and the procedures are underdocumented. The shop runs only because teams of experts can be assembled on the spur of the moment to solve problems we did not anticipate. The overall reliability of the computer center as a facility is unacceptably low and too error prone for the important role it plays in the Agency. Specifically:

1. Physical Facilities and Housekeeping.

The computer center is crowded, the operational areas are not laid out for smooth work flow, and we are inhibited somewhat by security aspects.

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However, the entire staff has relaxed and assumed slothful attitudes until the machine room is physically filthy and contains junk everywhere. The hardware vendors add to and contribute to the mess, and the mess in turn contributes to our lack of system reliability, our excess of reruns, and in some shoddy thinking.

Upon physically inspecting the electrical power, air conditioning, fire, and other emergency systems, I find similar shoddy work being done by the other activities that support our computer center! To cap all of this off, there aren't any written procedures to achieve the necessary coordination between the systems. Consequently, we are running an extremely vulnerable shop where one small human failure can rapidly and accidentally escalate into an incident of significance.

I'm dismayed to report that I can find no books of emergency procedures that direct the computer operations staff in their handling of emergencies within the computer center. I was unable to find books of emergency procedures that direct the facilities people in handling emergencies related to the power which supplies the computer center, or the air conditioning so necessary to our operation.

Further, by personal physical inspection, I conclude that the designs of the air conditioning and electrical systems which support the center were faulty since provisions were not made for shut-off of valves and emergency water drains in the air conditioning system, or for an electrical system to operate at part load or even to be practically tested under live backup conditions.

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2. Equipment Interconnection.

The computing equipment within the center is interconnected by power cables and signal cables. The documentation describing this interconnection is inadequate, and the training of the operations staff in the use of the flexibility designed into the system is also inadequate. When current documentation was obtained for my review I conclude that a great deal of our operational complexity (and hence unreliability) is due to the complex arrangement of signal interconnections within the computer center itself. On the paper, the system is good and appears to minimize the amount of hardware for the workload accommodated. Thus on paper, it is economic. However, we are very near the limit of stability for the combination of equipment, people, and software we have available. At the present time I strongly urge we do not increase the complexity level any more until the shop becomes stable. If we exert our best management efforts and are still unable to make the shop stable and reliable in the next few months, I recommend that we step back from the threshold and reduce the complexity in the shop by uncabling some of the interconnecting devices and switches even if this means additional equipment and/or additional operational staff.

3. Computer Software.

The Agency has a complex of computer software which is equaled only by 15 or 20 other leading edge computer shops in the world. We have a bright group of systems programmers who are knowledgeable in the art and who have prepared for production use some of the most modern software available anywhere. However, that software is not documented and therefore

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the operators are not well trained in its use. There is no users manual, therefore the customers of our computer shop are not appraised of the software features and hence cannot exploit them correctly.

Finally, the software is so complex that ever with the talent we have available to nurture it we have been unable to get it stable and reliable. In one case we have some defective software which gives unreliable terminal service and instead of fixing the defective software we are changing the terminal hardware so we can use a different software package which ostensibly is more reliable. In another case we had some software which had pathological difficulties under certain circumstances, and we added additional hardware so those circumstances would not occur (the additional hardware also gave us better performance).

It's clear that our software is complex enough and our work is clearly before us. Instead of inventing new function we must direct the software staff to documenting what we have, cleaning it up, and making it reliable. Some of the more talented people will not be able to address this task for the year or so it will require. They will get moody, unhappy, and some of them may leave the Agency. If this occurs, it's unfortunate, but I still would not swerve from the necessary task of formalizing the documentation and the procedures to manage change within the shop rather than let change manage us.

4. Operational Procedures.

A minimal set of operational check lists for the computer operators running the system now exists. These check lists address only the normal routine activities and do this only in the skimpiest form. There are also

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several sets of partially completed and obsolete procedures which have been created in the past. We urgently need a full set of operational procedures covering all normal operations and any emergencies which can be considered routine. In addition we must make provision for maintaining these procedures whenever changes are made in either the hardware or the software. Finally, we must install a mechanism so when an incident of significance occurs which is not covered in the procedures, that the procedures are augmented so such incidents are covered in the future. In short, we must retain our learning in written form so we can tolerate personnel turnover, allow talented people to be promoted, and offer a uniform high degree of service on nights, weekends and over holidays.

Contingency
Learn by experience

5. Manager Skills and Personalities.

Most of our managers are bright and talented and competent to become capable in the jobs to which they are assigned. However, most of our managers are unseasoned in slots they are occupying, and hence are learning as they go. I see no solution other than to tolerate this learning and to accelerate it by bringing these managers into contact with persons holding like jobs in other locations. However, this training must be directed so our people come into contact with other managers who are facing similar problems in similar environments.

Travel and meeting attendance is socially broadening, but we must pinpoint our deficiencies and make specific contacts with individuals from whom we can learn. One example will drive home this point: One of our managers signed up for a course because it had a title related to part of

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In addition to the problem of training and seasoning, we have a few managers who have serious deficiencies in either personality, skill, or drive. Unfortunately, they are in key slots and their deficiencies are seriously impacting the center. A partial solution will be to reorganize the shop slightly and reassign responsibilities so these employees may work successfully in areas where they can contribute; however, there are one or two individuals who are occupying important positions who are not performing satisfactorily in our environment. We may need to trade these individuals to some other organization. I also note that we need Doug [redacted] (or an equivalent person) to fulfill his role as a technical Deputy to you. The gap I see is in middle technical management. A crew of unseasoned managers needs someone to give them direction, to review their work, and to ask difficult technical questions about the proposals that are made and the decisions that are contemplated. With [redacted] slot open, this check and balance is not taking place.

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6. Vendor Relations.

Our computer system is assembled from the products offered by several vendors. Our relations with these vendors, and our management of the vendor work force is more appropriate to a simple shop operating without pressure. However, our relations with the vendors and the support we

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receive from them is not satisfactory for the level of sophistication and complexity we have created. Our relations with IBM have been poor, and we have recently had management changes on IBM's work force. However, although the new man has been on board seven weeks, he is still not cleared and not thoroughly in control of the IBM employees that answer to him.

IBM itself is on the horns of a dilemma because they don't know how to deal with a shop of this complexity anywhere (all of my big complex industrial clients are in trouble too). The problem is compounded by the arms length relations brought about by the Government procurement relations and is furthermore amplified by the technical problems caused by interfacing gear from multiple vendors into a single system. When on top of this, I add the constant flow of changes through the shop and the overcrowding in both the office and computer areas, I get a very unsavory stew.

We must give the new IBM management crew a chance and we must be extremely careful that this Agency does not overstep its rights and try and manage the business of the IBM Corporation. HOWEVER, we can and should define our needs in an unemotional way and insist that IBM give us competent professional service in response for the dollars we pay them.

In addition, we can call the attention of IBM's management to the problem of complexity in a shop the size of our and configured the way ours is. Several of the IBM manuals and some of the IBM training needs upgrade to be sufficient to support our needs. In addition, where we face problems

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which are not unique to the Agency but are indigenous to the kinds of hardware and software we have installed, we should inform IBM that we expect them to exercise their initiative and funnel experience from similar customers into us so we may all learn collectively. IBM should be constantly alert for common problems unique to big systems, and where common problems are identified they should exercise initiative and leadership to produce solutions for these common problems. In short, we should advise IBM we don't expect to have to solve all of these problems ourselves with our own resources.

7. Policies and Standards.

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Mr. [redacted] and the Information Processing Board need to direct their attention to the creation of a series of Agency-wide policies, and to cause appropriate standards to be created so the Agency can do business in a uniform manner where such uniformity is in the best interest of our mission and does not unduly inhibit our staff. Due to the lack of this body of policy and due to the lack of standards which would be derived from the policies, we have constant contention between the users and the central computer facility as to the rights and privileges of each. In several noteworthy cases the users have unilaterally taken steps which lower the overall reliability of the center, which make the management of change unnecessarily difficult, or which add to the number of exceptions or special cases to be borne by the computer operations staff.

The direction is clear; we must establish a series of policies and standards binding on all users, binding on the central computer facility,

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and binding on all contractors preparing work to be run within the Headquarters. In the same breath we must establish a procedure so exceptions to these standards may be requested. The Information Processing Board must promptly consider those requests for exceptions and authorize deviations when in the interest of the Agency and demand adherence in all other cases.

As this is done, the Information Processing Board needs to request an accounting to identify that portion of our present workload which is in dissonance with the newly adopted standards. The Information Processing Board must then lay in a plan and audit progress against that plan, to make sure that our present backlog of troublesome programs and practices is gradually eliminated.

8. Staffing.

With the exception of the selective reorganization and pruning described above, we have almost the correct staffing with a few exceptions. If we insist that the software developers and maintainers document thoroughly (to get stability and control) they will need to review their present workload commitments and either decommit from some activities or have their numbers augmented by additional system programmers.

Our computer operations staff is barely adequate for the number of shifts we work. Specifically, some of the night/weekend shifts are pretty skimpy (only two men responsible for $25,000,000 worth of equipment on a Sunday graveyard). We can make some physical changes to improve the efficiency of the computer operators. But if our workload grows to where we must use all of our equipment on third shift and on the weekends,

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we will need to have additional operator help. We should constantly track the number of jobs run versus the number of operators and consider augmenting the operations staff when the number of jobs which requires setup increases significantly.

9. Security.

At the present time we have acquired Agency staff clearances for all of the employees who have routine access to the computer center. This is a fairly large group of people numbering [redacted] STATINTL

TATINTL [redacted] from Technical Services, plus some vendor personnel and another dozen or so for about [redacted] This group of STATINTL

STATINTL [redacted] has access, should they choose to exercise it, to all of the tape and disk files in the Center. Thus, while the remainder of the Agency is heavily compartmented, they bring precious information to the computer center and we remove the compartmentation and make this information accessible to anyone of the [redacted]. We are indeed STATINTL fortunate that these are highly-cleared loyal citizens, but actually compartmentation breaks down when we enter the computer center, personal accountability is lost, and group accountability is substituted!

This situation need not be; we could take some steps to tighten the security within the computer center without unduly adding manpower or unduly reducing our efficiency. It would take some development, talent, and dollars, but it is within our ability to do better, and there would be little or no on-going operational cost if we introduced some security checks into the facility.

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In addition, due to the lack of procedures I mentioned above, we have increased the probability that a simple human error may result in a slip up. I do not intend to over-dramatize, but the literature contains information on how to secure most of a computer center. We have not adopted these safeguards. We must assume that any malicious individual is both talented and well read. Thus, we are exposed unduly by our group accountability practice.

In addition to the above problem dealing with fundamental security philosophy, I have reviewed several of our security procedures in detail and found them wanting. These things have been discussed with [redacted] STATINTL

STATINTL [redacted] and he is taking immediate action to correct the procedures and reindoctrinate the individuals using bad judgment. However, the major philosophical point described above must be discussed, a policy established, and if group accountability is not satisfactory, significant amounts of development effort must be channeled into improving the security within the computer center.

10. Future.

Unless our plans are changed, the future bodes further ill. On the first of the year, we plan to install the long awaited SIPS/GIMS-II system. This will introduce additional complexity into the shop and require additional procedures and additional operator training over and above those described above. This plan must be carefully reviewed and we must organize and administrate diligently to avoid a slip in the cutover date now scheduled for January 1.

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Over the last few years, we have attempted to install an accounting and usage measurement system so we may both bill our customers and understand how well we are exploiting our equipment. Progress made to date has been judged unsatisfactory; you have drawn all of these STATINTL activities together, appointed [redacted] as project director, and urged him to get on with the job so we may bill for our computer services and learn how our resources are being spent. In the near future we will see a plan for this effort including the procurement of some additional computer STATINTL software known as "PACES". When that plan is prepared, we must carefully review it and be sure it reduces our complexity and enhances our stability [redacted]

We also plan to release the Spectra 70 computer system on the first of January. The computer programs not destined to be replaced by SIPS are to be run under a pair of simulators now being hurriedly prepared for the 360 equipment. Some of these programs are important periodic administrative programs, and our production on them must be reliable. However, due to unfortunate planning, one key individual familiar with much of this is leaving for school at the same time the Spectra computer is discontinued. We must thoroughly review the status of all these activities to determine whether to defer his schooling or to find a stand-in if the risk looks significant.

These three projects, together with the last series of equipment moves and reconfigurations, plus the introduction of a new improved version of the ASP software, should probably be allowed to continue. However, that is an extremely complex series of activities to lay on an unstable shop in 90 days!

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There is a study effort under foot which will lead to the eventual linking of the three computer centers located here in the Headquarters building by hard copper wiring. At the present time, it appears that we have enough challenges facing us, and enough worl before us so that this project should stay in the feasibility stage for all of Calendar 1973. We simply cannot tolerate the effort required to produce the plan in '73 so we can link the facilities in '74. I suggest you have the linking committee redirected to produce common standards for the three computer facilities and to defer linking until the shop becomes stable and the management of change is a reality.

The Advanced Projects Staff has a plan for procuring a first generation mass storage device in 1973 with delivery in 1974. Having just reviewed the documentation on this project, I conclude the studies done to date are insufficient to support a specification or to procure a mass storage device for delivery in 1973.

There are some prerequisite steps we can take as soon as the shop becomes stable to introduce discipline in the use and naming of files, to formalize our library procedures, to enumerate the handling exceptions, and to get meaningful statistics on the workload the mass storage must face. These activities I think should proceed, and we may wish to augment our in-house technical talent with one or two additional study contracts provided work statements are carefully drawn, and we know what to do with the products we request. However, the mainline procurement should be sidetracked until the shop becomes stable and until we understand enough

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about our current instability to write the specification for the mass storage so it does not reintroduce instability.

In summary, I think our mass storage project has yet to do its homework. It may be the current state of the mass storage technology is not sufficient to support stable production operations.

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To solve these problems will take time and direct management leadership. We also must exercise judgment as to the importance and severity of the problems facing us and work on first things first. We also need to introduce an attitudinal change throughout our entire shop and through the shops providing us supporting services. We must say NO when that's in the best interest of the Agency; we must say NO whenever schedules are being set without proper planning; and we must say NO to plans which will result in an unprofessional product, security risk, or unstable operation.

Most of our problems result from our inability to manage change, our attempt to be at the front of the computer sciences art, our inadequate planning, and our unseasoned management team.

Sincerely yours,

Bob

[redacted] STATINTL

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OCS-1149-72
2 NOV 1972

MEMORANDUM FOR: Deputy Director for Science and Technology

25X1A SUBJECT : [redacted] Audit Report

25X1A

[redacted] has reviewed OCS computer operations in detail. He has published a 15 page summary and plans 10 attachments. He was dismayed. I quote from his summary:

a. "The complexity in the computer facility exceeds the capability of the incumbent managers at all levels. The rate of change in the computer center exceeds the capacity of the staff to keep up. After meeting about 50 of your employees, I did not find a single one who was professionally comfortable in the face of foreseeable problems. The pace is rushed, the staff is overworked, and the procedures are underdocumented. The shop runs only because teams of experts can be assembled on the spur of the moment to solve problems we did not anticipate. The overall reliability of the computer center as a facility is unacceptably low and too error prone for the important role it plays in the Agency. Specifically: (He discusses the following.)

1. Physical Facilities and Housekeeping.
2. Equipment Interconnection.
3. Computer Software.
4. Operational Procedures.
5. Manager Skills and Personalities.
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SUBJECT: [redacted] **Audit Report**

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JOHN D. IAMS
Director of Computer Services

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receive from them is not satisfactory for the level of sophistication and complexity we have created. Our relations with IBM have been poor, and we have recently had management changes on IBM's work force. However, although the new man has been on board seven weeks, he is still not cleared and not thoroughly in control of the IBM employees that answer to him.

IBM itself is on the horns of a dilemma because they don't know how to deal with a shop of this complexity anywhere (all of my big complex industrial clients are in trouble too). The problem is compounded by the arms length relations brought about by the Government procurement relations and is furthermore amplified by the technical problems caused by interfacing gear from multiple vendors into a single system. When on top of this, I add the constant flow of changes through the shop and the overcrowding in both the office and computer areas, I get a very unsavory stew.

We must give the new IBM management crew a chance and we must be extremely careful that this Agency does not overstep its rights and try and manage the business of the IBM Corporation. HOWEVER, we can and should define our needs in an unemotional way and insist that IBM give us competent professional service in response for the dollars we pay them.

In addition, we can call the attention of IBM's management to the problem of complexity in a shop the size of ours and configured the way ours is. Several of the IBM manuals and some of the IBM training needs upgrade to be sufficient to support our needs. In addition, where we face problems

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which are not unique to the Agency but are indigenous to the kinds of hardware and software we have installed, we should inform IBM that we expect them to exercise their initiative and funnel experience from similar customers into us so we may all learn collectively. IBM should be constantly alert for common problems unique to big systems, and where common problems are identified they should exercise initiative and leadership to produce solutions for these common problems. In short, we should advise IBM we don't expect to have to solve all of these problems ourselves with our own resources.

7. Policies and Standards.

STATINTL Mr. [redacted] and the Information Processing Board need to direct their attention to the creation of a series of Agency-wide policies, and to cause appropriate standards to be created so the Agency can do business in a uniform manner where such uniformity is in the best interest of our mission and does not unduly inhibit our staff. Due to the lack of this body of policy and due to the lack of standards which would be derived from the policies, we have constant contention between the users and the central computer facility as to the rights and privileges of each. In several noteworthy cases the users have unilaterally taken steps which lower the overall reliability of the center, which make the management of change unnecessarily difficult, or which add to the number of exceptions or special cases to be borne by the computer operations staff.

The direction is clear; we must establish a series of policies and standards binding on all users, binding on the central computer facility,

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and binding on all contractors preparing work to be run within the Headquarters. In the same breath we must establish a procedure so exceptions to these standards may be requested. The Information Processing Board must promptly consider those requests for exceptions and authorize deviations when in the interest of the Agency and demand adherence in all other cases.

As this is done, the Information Processing Board needs to request an accounting to identify that portion of our present workload which is in dissonance with the newly adopted standards. The Information Processing Board must then lay in a plan and audit progress against that plan, to make sure that our present backlog of troublesome programs and practices is gradually eliminated.

8. Staffing.

With the exception of the selective reorganization and pruning described above, we have almost the correct staffing with a few exceptions. If we insist that the software developers and maintainers document thoroughly (to get stability and control) they will need to review their present workload commitments and either decommit from some activities or have their numbers augmented by additional system programmers.

Our computer operations staff is barely adequate for the number of shifts we work. Specifically, some of the night/weekend shifts are pretty skimpy (only two men responsible for $25,000,000 worth of equipment on a Sunday graveyard). We can make some physical changes to improve the efficiency of the computer operators. But if our workload grows to where we must use all of our equipment on third shift and on the weekends,

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we will need to have additional operator help. We should constantly track the number of jobs run versus the number of operators and consider augmenting the operations staff when the number of jobs which requires setup increases significantly.

9. Security.

At the present time we have acquired Agency staff clearances for all of the employees who have routine access to the computer center. This is a fairly large group of people numbering [redacted] STATINTL STATINTL [redacted] from Technical Services, plus some vendor personnel and another dozen or so for about [redacted] STATINTL. This group of STATINTL [redacted] has access, should they choose to exercise it, to all of the tape and disk files in the Center. Thus, while the remainder of the Agency is heavily compartmented, they bring precious information to the computer center and we remove the compartmentation and make this information accessible to anyone of the [redacted] STATINTL We are indeed fortunate that these are highly-cleared loyal citizens, but actually compartmentation breaks down when we enter the computer center, personal accountability is lost, and group accountability is substituted!

This situation need not be; we could take some steps to tighten the security within the computer center without unduly adding manpower or unduly reducing our efficiency. It would take some development, talent, and dollars, but it is within our ability to do better, and there would be little or no on-going operational cost if we introduced some security checks into the facility.

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In addition, due to the lack of procedures I mentioned above, we have increased the probability that a simple human error may result in a slip up. I do not intend to over-dramatize, but the literature contains information on how to secure most of a computer center. We have not adopted these safeguards. We must assume that any malicious individual is both talented and well read. Thus, we are exposed unduly by our group accountability practice.

In addition to the above problem dealing with fundamental security philosophy, I have reviewed several of our security procedures in detail and found them wanting. These things have been discussed with [redacted] STATINTL STATINTL [redacted] and he is taking immediate action to correct the procedures and reindoctrinate the individuals using bad judgment. However, the major philosophical point described above must be discussed, a policy established, and if group accountability is not satisfactory, significant amounts of development effort must be channeled into improving the security within the computer center.

10. Future.

Unless our plans are changed, the future bodes further ill. On the first of the year, we plan to install the long awaited SIPS/GIMS-II system. This will introduce additional complexity into the shop and require additional procedures and additional operator training over and above those described above. This plan must be carefully reviewed and we must organize and administrate diligently to avoid a slip in the cutover date now scheduled for January 1.

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Over the last few years, we have attempted to install an accounting and usage measurement system so we may both bill our customers and understand how well we are exploiting our equipment. Progress made to date has been judged unsatisfactory; you have drawn all of these activities together, appointed [redacted] as project director, and urged him to get on with the job so we may bill for our computer services and learn how our resources are being spent. In the near future we will see a plan for this effort including the procurement of some additional computer software known as "PACES". When that plan is prepared, we must carefully review it and be sure it reduces our complexity and enhances our stability.

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We also plan to release the Spectra 70 computer system on the first of January. The computer programs not destined to be replaced by SIPS are to be run under a pair of simulators now being hurriedly prepared for the 360 equipment. Some of these programs are important periodic administrative programs, and our production on them must be reliable. However, due to unfortunate planning, one key individual familiar with much of this is leaving for school at the same time the Spectra computer is discontinued. We must thoroughly review the status of all these activities to determine whether to defer his schooling or to find a stand-in if the risk looks significant.

These three projects, together with the last series of equipment moves and reconfigurations, plus the introduction of a new improved version of the ASP software, should probably be allowed to continue. However, that is an extremely complex series of activities to lay on an unstable shop in 90 days!

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There is a study effort under foot which will lead to the eventual linking of the three computer centers located here in the Headquarters building by hard copper wiring. At the present time, it appears that we have enough challenges facing us, and enough work before us so that this project should stay in the feasibility stage for all of Calendar 1973. We simply cannot tolerate the effort required to produce the plan in '73 so we can link the facilities in '74. I suggest you have the linking committee redirected to produce common standards for the three computer facilities and to defer linking until the shop becomes stable and the management of change is a reality.

The Advanced Projects Staff has a plan for procuring a first generation mass storage device in 1973 with delivery in 1974. Having just reviewed the documentation on this project, I conclude the studies done to date are insufficient to support a specification or to procure a mass storage device for delivery in 1973.

There are some prerequisite steps we can take as soon as the shop becomes stable to introduce discipline in the use and naming of files, to formalize our library procedures, to enumerate the handling exceptions, and to get meaningful statistics on the workload the mass storage must face. These activities I think should proceed, and we may wish to augment our in-house technical talent with one or two additional study contracts provided work statements are carefully drawn, and we know what to do with the products we request. However, the mainline procurement should be sidetracked until the shop becomes stable and until we understand enough

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about our current instability to write the specification for the mass storage so it does not reintroduce instability.

In summary, I think our mass storage project has yet to do its homework. It may be the current state of the mass storage technology is not sufficient to support stable production operations.

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To solve these problems will take time and direct management leadership. We also must exercise judgment as to the importance and severity of the problems facing us and work on first things first. We also need to introduce an attitudinal change throughout our entire shop and through the shops providing us supporting services. We must say NO when that's in the best interest of the Agency; we must say NO whenever schedules are being set without proper planning; and we must say NO to plans which will result in an unprofessional product, security risk, or unstable operation.

Most of our problems result from our inability to manage change, our attempt to be at the front of the computer sciences art, our inadequate planning, and our unseasoned management team.

Sincerely yours,

Bob

STATINTL [redacted]

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Physical Facilities and Housekeeping Details

1. The electrical sub-station which supplies power to the computer facility is unsafe. Power distribution cabinets are being operated with the covers off and the bus bars exposed. There is temporary wiring everywhere. In some cases massive electrical cables are run without shielding. In some cases they are routed through the back of distribution cabinets rather than through the flash proof openings in the tops of the cabinets. All this temporary wiring should be removed and put in flash proof conduit. The covers should be placed on all cabinets, the forklift should be removed from the facility, and if this station is to be used for storage of electrical supplies, appropriate racks should be prepared so they do not clutter up the work space and do not prohibit ready access to the switch panels as they do now.

In addition, instructions to workmen should be prepared requiring the workmen to coordinate with the computer facility before disturbing the power except in emergencies. In anticipation of some accident which could cause the building to be darkened, additional instructions and additional coordination between the power plant, the distribution center, and the computer center will be required to repower the building and bring the computers back on line. Special battery operated lights should be present in this power vault and special sound powered telephones (which operate independent of the electrical system) should be prepared to allow those in the vault to communicate with the computer center.

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2. All that was said above concerning the electrical power sub-station can virtually be repeated concerning the massive motor generator set which supplies stable power to the computer. For safety's sake and to provide stability to the computer center, all temporary wiring must be removed, all cabling must be installed in flash proof conduits, all switch panels must be properly installed, and a full set of instructions must be in evidence. In addition, for all but the most dire emergencies, any workmen entering the motor generator vault must coordinate with the computer center beforehand so the computer center can be informed that maintenance is taking place and can take whatever actions seem to be appropriate. In addition, should the building ever go dark, coordination will be required between the person powering up the motor generator set and the computer operations personnel on the floor above. A sound powered telephone and clear cut instructions for the persons at both ends of that telephone should be prepared against all foreseeable emergencies.

3. The air conditioning compressors which are located off the Director's garage and supply chilled water to the 195 and the new air handlers look as if they were properly installed. However, there were no instructions in evidence to workmen requiring them to contact the computer center should this equipment

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require service. Further, there are no annunciator panels in the computer center which indicate that the air conditioning system has automatically switched to the backup pair of compressors in the event of some malfunction. Signal lines should be run to the computer center so the chief computer operator can be informed whenever the air conditioning automatically switches. Thus he can help follow up on the facilities people to be sure that help is on the way. In addition, there needs to be instructions and telephone communication between the air conditioning vault and the computer center so when the system is restarted following an emergency, the proper coordination can be effected. This of course must be accompanied by manuals of procedure at both ends of the telephone.

4. The main air conditioning room needs maintenance. There are tools and blueprints laying around, there are no books of procedure in evidence, there are no wall mounted warning signs advising workmen that this is a precious air conditioning system and any extensive maintenance or shutdown should be coordinated with the computer center. Although there was one set of permanent temperature and control instrumentation, I was advised that it does not monitor the flow to the main computer center and that the main computer center has no such instrumentation. There are no signal or annunciator panels in evidence either in

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the computer center or in the air conditioning room showing out of bounds conditions; there are a series of gauges on the walls in both locations, but the legal flow, temperature, and pressure ranges are not marked upon them.

There is one water leak which drips down on what appears to be an electrical feedwater pump, but the feedwater pump had been protected by a garbage can lid so the water ran off and made a pool on the floor. There are additional pressure tanks and instrumentation recently installed that are wired to supporting structural columns rather than being clamped as in a permanent installation. All in all the room needed maintenance badly, needs warning signs and instruction books, and needs sound powered telephones for communicating with the computer center. The computer center needs a remote annunciator and instrumentation so trouble with the air conditioning can be announced and followup actions may be initiated.

5. The central computer center is a vital support facility. Without clear cut signs advising all workmen of this fact, it is quite likely that from time to time workmen will repair and modify support facilities without proper coordination with the computer center. When this occurs the computer center can be disabled or hampered from performing its mission.

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6. In times of emergency, coordination must be effected between the computer center and the facilities people. Such coordination must be anticipated and books of procedure and communications channels must be prepared in advance. In the event we were to switch from VEPCO power to our own diesels, procedures should be in place so the computer center can be informed and cause all of the computers to go into the wait state and then be restarted after the switch has been made.

Should the building ever go dark, the computer center must be informed by a hot line from the power house. A plan must be implemented so that all the computer load is switched off in the center. After the power house people power up the motor generator set, they must then restart at least a portion of our air conditioning, and then the computers must be re-started. This exercise has never been practiced and I suspect it has never been planned in meticulous detail. I was informed that the non-critical loads are never cut off the building network even though the standby diesel generator is exercised monthly. The first time we exercise emergency power in a real situation we are likely to have difficulty.

Furthermore, in the last few years we have installed remote computer terminals and remote job entry stations throughout the building. One wonders whether these are on the emergency power,

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or whether at least some portion of these are powered from the non-critical portions of the network. The further question immediately comes up if some are powered from the non-critical portions of the network, what switches must be thrown in the computer center to isolate these units so they will not inhibit operation on the remainder of the computer system? We should also review that those units which are powered from the commercial portion of the network are not critical to some activity we would like to maintain during a long term emergency. With the books of procedures concerning fundamental switching and procedures being unavailable for my review, I am fairly sure the above analysis has never taken place.

7. Given that the power and air conditioning fundamentals are cleaned up as referred to above, several additional steps are warranted. The air conditioning and power vaults are protected by simple hotel type door knobs. Since these facilities are so very vital to the operation of the computer center, special locks and motion sensors should probably be installed.

8. Not all computer equipment is designed to the same standards as IBM uses. IBM equipment should be self-protected sufficiently that perturbations in power or temperature should cause it to automatically power down before it damages itself. Equipment

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from other manufacturers does not always do this and corners are frequently cut when custom equipment is purchased. When the manual of emergency procedures for the computer center is prepared, it should therefore give special attention to the equipment made by other manufacturers and if any notice comes from the power house an operator should rush around and cycle the power down on all this other equipment.

9. In the case of the main computer center, we should perform an analysis to know how many tons of air conditioning are available from each air handler and how many KW of power are required by each of the operable computer configurations. Then if the power house informs us that we can have some power, but not our full complement, we can determine which of our systems to power down so we stay within the limits set for us by the power house. In addition, knowing what units we cycle down, we can then inform the air conditioning people which of their units they can shut down while still maintaining the temperature limits in the computer room.

The computer center is a monstrous electrical load and the related water chillers and air handlers add to that large load. While it is true that the computer center must have its motor generator set before it can operate at all, it can operate that motor generator at part load (and thereby reduce the demands on

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the power house) by merely shutting down certain combinations of equipment so we still have at least one operable computer system even though full power may not be available to run the whole facility.

10. When this power and air conditioning analysis is performed, it is quite likely that several specific units will need to be recabled. For instance, the master digital time of day clock appears to run off non-critical building power. If this is true, can we get along without it? If so, how much post emergency chaos will operating without the master clock cause? In addition, we should be very careful as to how the communication switch gear and patch panels are powered to be sure that they survive a power emergency. Finally, the IBM 2914 reconfiguration switches must be reviewed to be sure that they are powered under all conditions because they can disable a large part of our I/O if they are not.

11. As was mentioned in the summary report, the computer center itself is overly crowded. However, we are not using the available space very well either. In a physical inspection of the facility, I found spare cables, spare parts, old manuals, some reports dating back into history, miscellaneous card decks, and some plain junk occupying space in the computer center. We should appoint a crew chief for the computer center and make him

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responsible for the establishment of reasonable housekeeping rules and for the adherence to those housekeeping rules by all employees and all vendor maintenance personnel. We should get everything out of the computer center that is not absolutely required for its operation or maintenance. We should go through every book case and every shelf and discard all of the books and manuals not current and not needed. This even applies to the multiple copies of obsolete manuals around the computer operating consoles.

Once we've cleaned up and thrown out everything that is unnecessarily stored in the computer center, we should then go back and make sure that one and only one current copy of all documentation is stored in the computer center and that it is stored where it is most likely to be needed. Multiple copies of documentation tend to get obsolete quickly and back level manuals are likely to be troublesome.

There are many feet of blank wall in the computer center and strips for shelving should be installed in every possible location. Shelving should then be acquired (and painted before it is installed) so that there is space to store plotter supplies without piling on top of an air conditioner, space for necessary punched cards in little trays without stacking them on tables, appropriate storage for books and manuals, and appropriate shelf

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space for maintenance manuals, spare parts, electronic test gear, etc. Every shelf should be marked with the name of the organization responsible for it, and cleanliness must come right after Godliness.

12. The janitor in the computer room should be required to discard his broom and should be given an industrial type tank vacuum which suitably filters the output air to prevent dust particles from being blown back into the room. The entire computer center should be vacuumed and mopped at least weekly with the more heavily traveled portions vacuumed daily. The janitor should vacuum on the tops of cabinets. Whenever a floor panel is picked up for any reason, the janitor should be present and should vacuum under the floor. Eventually the computer facility will be cleaned up. In addition, all untreated dust rags should be discarded and should be replaced by "tack cloths." Finally, a tack mat should be acquired and installed at the "point" and a second tack mat should be acquired and installed at the hall door. These tack mats will clean the shoes of the entering employees and keep much dust and dirt from being tracked into the computer center. As a final step, all equipment should be uncrated in the hall, cleaned as appropriate, and then brought into the computer center, thus eliminating the boxing and crating mess.

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13. When the crew chief is appointed, he and each responsible vendor should review each of the vendor's pieces of installed equipment individually and determine whether it is properly installed, has been properly maintained, and is physically clean. When this inspection takes place, it will determine that some units are incorrectly installed and have been cabled so that is is impossible for the cabinet doors to close. Other units will be found to be dirty. Other units will be found to have cabinetry and latches in need of repair. Other units will need to have cables properly dressed and in some cases the Agency will need to pull floor panels so that cables can be properly installed.

A second result of this physical inspection will determine if proper furniture has been provided for the work taking place and if adequate storage facilities are available. In some cases I saw repairable circuit cards being thrown in a heap of other tools without suitable protection, thereby reducing their expected life. In other cases I saw cables running over the floor, cables which would not allow cabinet doors to be closed, and cables unnecessarily running through the air like temporary power cables when what they obviously powered was a permanent installation. I saw old obsolete manuals, I saw loose bolts and nuts (in one case I threw away some screws laying on top of a

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piece of equipment), I saw metal chassis parts laying on top of painted surfaces, I saw machine covers off and leaning against walls, I saw spare floor panels stored behind machines, I saw one notable table covered with heaps of unusable punched cards, and I saw pieces of tape spoolers, squawk boxes, and printer parts discarded in various and sundry "convenient" locations. Mainly I saw a crowded machine room populated by employees of the Agency and vendor representatives who were not making the additional effort necessary to live without clutter.

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Equipment Interconnection Details

1. The equipment interconnection is a key process which affects routine operations, the software prepared by the system programmers (particularly I/O GENS), the relationships and interfaces between our multiple vendors, the accounting we do to honor a vendor's monthly invoice, the cost pools we are about to set up, and the chief operator's manual of foreseeable emergencies (which we are about to prepare).

The work done to date addresses only equipment interconnection in the narrowest sense. The documentation is not generally available, and what documentation is available is not suitable for the multiple purposes described above.

STATINTL [redacted] needs some assistance in deciding how to prepare configuration diagrams suitable for the multiple purposes indicated above with special attention applied to the geometric layout of the drawings themselves so the drawings will be clear to the various readers who need copies of them.

2. As of this writing (11/6/72), we have just executed the first of five consecutive moves to reconfigure the shop and add some additional 2914 switches to provide flexibility in the event of malfunction. I recommend that these moves continue as planned and that the move crew should not be disturbed in their efforts over the next month. However, as soon as this sequence of moves is completed, the steps outlined below need to be taken.

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3. An overall system interconnection diagram needs to be prepared on a single sheet of paper with copies posted on

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the wall in [redacted] office and an additional copy on the wall just inside the computer room door next to the blackboard. Once the configuration is set, IBM should be requested to perform "systems assurance" on this configuration to make sure that all cable lengths are within legal limits.

4. A DYMO label should be prepared for each hardware box telling the power panel which controls power to that box.

5. Each power panel should be identified with a 4" high number which is visible from across the room.

6. The doors on each power panel should have a sheet placed on their outer faces which enumerates the power switches contained therein and the boxes they control.

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7. [redacted] Tuesday morning technical meetings should review the cabling of the center, the SYSGENSs for the center, the switching within the center and enumerate the switches to be thrown and the configurations to be operated in the event of a CPU failure, a channel failure, a drum failure, or certain disk control units. (All other units either have duplicates or are unique and cannot be bypassed.)

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8. After these analyses are performed and [redacted] has STATINTL assured the team that the appropriate software has been generated, a chapter for the Chief Operator's Manual should be prepared telling him what action to take in the event a hardware box goes down and relating those actions to the physical hardware pictorial prepared by [redacted] STATINTL and the software prepared STATINTL by [redacted] These instructions should encompass details about what disk paks to move, what files to reload, what disk paks to replace with scratch paks, whether the queues survive, how to restart the spooled I/O, etc. Hopefully this can be done with a standard checklist so the scenario has a certain uniformity to it regardless of which situation the Chief Operator must face.

9. After the signal cabling has been checked out as described above, the power cabling for the computer room must be abstracted and traced back to be sure that like units are powered from the same power panel. Thus if we should take Model 65-2 down for some problem involving power, the other units on that same distribution panel should be units uniquely associated with 65-2 (if possible) so we do not lose critical units from two or three systems in the event we must power one supply panel down.

10. Finally we should ask the [redacted] Committee to carefully rethink the relationship of the GIMS Model 65 to the STATINTL

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remainder of the ASP System. Theoretically it is desirable to have the GIMS Model 65 under ASP so the I/O devices may be pooled. However, if GIMS has enough workload to keep one or two I/O devices busy, then having those devices under ASP merely adds unnecessary I/O traffic to the ASP support computer and reduces the reliability of the shop since all five computers are required to operate reliably as a single monster system.

11. In the next breath we should review the relations of the two Model 67s to ASP. We have seen in the past where a Model 67 has brought down the ASP system and other occasions where ASP has brought down the Model 67 system. Obviously the Model 67s must be connected to the ASP system so work can be passed back and forth. But this interface can be formalized so that it is failsafe and the second Model 67 can be isolated by switches so software developments under CP do not affect the production system.

12. A bit of philosophy is important here: *For a given technology, increasing the component count in a system reduces the reliability of that system even though it may increase the performance of the system when all units are operating.* The two 67s, the two 65s, the 195, and all of our I/O equipment

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are essentially the same technology. It thereby follows that the most reliable system would be one configured with a Model 65 performing the support function for the 195, with GIMS cut off as a separate stand-alone machine utilizing its own I/O, and with the two 67s communicating with the support 65 such that they appeared to be only remote job entry terminals. While this would be a step back from the way we are now operating, it might be a step towards additional system reliability.

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Computer Software Details

1. The computer software crew under [redacted] contains some STATINTL very talented individuals, but they need to be focused on a set of objectives meaningful to the Center. There is enough turnover in this crew that it would be wise to prepare a check-list for performing all systems activities starting with the new release from IBM through a complete SYSGEN. In the future, releases from IBM are going to come few and far between. IBM has even claimed they are getting ready to "stabilize" OS/MVT. We should prepare a checklist and should relate that checklist to time through the mechanism of a simplified PERT chart so we have recorded our learning. Thus whenever it is necessary to do an I/O GEN, an ASP GEN, a SYSGEN, change the PROCLIB, modify the members of LINKPAK, add or delete a language processor, or introduce a new piece of non-standard equipment, the procedure would be written down and current.

2. In addition, procedures should be prepared for reviewing the incident log, for recognizing long term trends in the incident log, and for relating troubles back to their hardware or software sources. At the present time the incident log is merely a recording and followup system to achieve immediate action. The long term trends are not being analyzed so fundamental repairs can be initiated as required.

3. The accounting information and the SMF log tape should be processed so the software architects are knowledgeable about

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what our customers are using in the shop and the difficulties they are having with it. If an extensive number of ABENDS indicate software problems, those problems should be isolated and repaired. If the statistics indicate the flavor of the workload is changing, new procedures may be called for or perhaps the contents of LINKPAK should be revised.

4. By looking at the I/O delays and the number of tape drives we have to accommodate the setup function, we may decide to implement the ASP feature which causes ASP to write tape labels and keep data access records.

5. If the statistics show that some programmers are having difficulty with given pieces of software or given functions and if these routines and units check out properly, then it may be that additional Tech Notes need to be written or perhaps training courses need to be held.

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6. [redacted] prepares students for entry level programming

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and [redacted] assists customers in solving problems when they come to her. To partially bridge that gap, we need to establish a master library of manuals, magazines, and techniques and make that available to all of our users. We need to obtain the assistance of the manufacturers in keeping this library current.

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7. We need to have organized distribution lists so that we know what manuals are in the hands of our customers. Whenever a new addition of the manual becomes available or an amendment to that manual is published, we should make sure that the new material finds its way into the customer files to replace the obsolete material.

8. We urgently need a users manual and a set of standards which will be binding on all programmers be they employed by the Agency or by contractors.

9. In summary, we should document what we have and the procedures for maintaining it. We should then proceed to use the statistics that are available to us to improve our software products while at all times trying to achieve additional reliability and stability in our computer operation.

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10. We should detail one person to work with [redacted] in preparing a plan for the installation of the PACES accounting system. This will not be a trivial change and the software must be carefully modified and thoroughly tested before it is installed. The best protection against interrupted operations will be a careful plan so PACES can be introduced with a minimum of turbulence.

11. Software changes are intrinsically related to the operational documentation (see Attachment #4). We must prepare

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a checkoff system and present it to the crew chief reponsible for the computer center so he can verify that a proposed software change package is in fact complete. Specifically, a software change should be accompanied by a two to six page narrative description of the change, a statement of its costs and benefits, a statement of its probable impact on reliability or configuration flexibility, new inserts for the routine operator's manuals kept on each console, new inserts for the chief operator's emergency manual, full internal documentation of the software change for maintenance purposes, a statement as to what this change is going to do to our machine charges for production jobs, an enumeration of any hardware changes (if any) which must be coordinated with this change, and appropriate change pages to the Users Manual and the applications programming standards as appropriate. In addition, the change package should contain a certification that it has properly executed the collection of programs on the application program test tape and/or has seen limited production on the development Model 67 for a specified workload.

12. The tape of application programs referred to in the previous paragraph now numbers about 200 programs, and takes several hours of ASP time to run. The preparation, maintenance, and input to that tape should be formalized so the vendors may

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contribute troublesome programs to the set and so that both Operations and Customer Services continually inputs programs found to be troublesome.

13. Several tools need to be prepared by the software group for its own use. One which stands out immediately is a tool to allow output from the applications test tape (above) to be recorded as a partitioned data set on disk so the output from one run may be compared by machine with the output from a previous run rather than print all those outputs and perform eyeball verification.

14. In summary, the software section sets the pace for the entire computer operation. We must get the current system documented so that a firm foundation is laid for the changes sure to come in the future. The impact of PACES, the preparation for mass storage, management accounting to provide surveillance over the time sharing workload, and a constant review of problems and statistics will allow us to manage our shop rather than merely administrate it. For the next year stability and reliability should be chosen over the addition of new function.

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Operational Procedures Detail

1. We need to appoint a crew chief for the computer center to be responsible for the housekeeping of the computer center, for the support required by our computer center, and to be the single focal point which manages all change. This person should be strong willed but fair. He should insist that jobs be done right the first time so they need not be redone. He should also make sure that all vendors and all employees have the right physical facilities for performing their work.

The Configuration Board should establish procedures to be followed for introducing various kinds of changes to the facility, and the crew chief should administer those procedures to the letter. Specifically, the person initiating the change for the first time should prepare a checklist so that the crew chief can verify that the change has been properly planned and that the change package is complete. The crew chief should take that change checklist to the Configuration Board and seek its approval. In doing so he should be sure that all related documentation is prepared and that any emergency procedures are modified as required. After approval by the Change Board, he should proceed to monitor the change against the checklist and only allow it to be installed when all of the checklist provisions have been fulfilled. The crew chief should keep historical records on changes and checklists and eventually should prepare some

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master checklists for recurring changes (such as a software SYSGEN or a recabling). In short, the crew chief should retain our knowledge in an organized form and should act as a check and a balance which will increase the quality of the planning prior to the time the change is introduced.

2. We urgently need a chief operator's manual. The bits and pieces of documentation now in the notebooks on each computer console should be entered into one chapter of the chief operator's manual entitled Routine Operations. In addition, there should be a chapter on Routine Hardware Maintenance, a chapter on Trouble Reporting and Incident Logs, a chapter on Security, a chapter on Library Procedures, a chapter on Abnormal Operations, and a chapter on Emergency Procedures. And finally a chapter on Power and Air Conditioning and its relationship to the computer center.

The goal of this manual should be to keep small incidents from escalating into major problems. Furthermore, this manual will be a place for knowledge to be stored so that the chief operator and the staff working for him can start to be self-sufficient and independent from the system programmers and the hardware planners. It should be possible to run the computer center with the people assigned to a shift even though the telephone system may be out and specialists cannot be contacted to

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assist with routine problems. We must know how to cycle the power up and down within our center, and we must know how to coordinate our activities with the supporting power and air conditioning services. We must know how to move paks and throw switches to reconfigure the shop as long as we've got power and air conditioning, and we must know how to do a preventative shut down when called for.

3. As soon as a chief operator's manual is prepared, each operator who acts as a chief operator must be given training in the content of the manual, time to study it, and made to sign a signature sheet indicating that he has read the manual and understands it. Whenever a change is introduced to the manual, the previous signature sheet indicates every man who must be given time to review the changes and sign a new signature sheet to indicate that he understands the current contents of the manual.

4. There are three emergency buttons near the exit door of the computer center. Two deal with power and one deals with air conditioning. The labels on these buttons are not particularly informative. The shift chief's manual must tell exactly what happens when those buttons are pushed and then tell what actions must be taken to recover full operation in the event the buttons are pushed inadvertantly.

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5. One section of the chief operator's manual must deal with logs, records, cleanliness, and machine room procedures. Items covered should range from a log of requests to increase a priority to routine operational procedures such as keeping all tape doors closed except when mounting or dismounting a tape.

6. The crew chief will carry the responsibility to get proper labels on the smoke detection system, the water detection system, the power panels, and the like. The chief operator's manual should contain instructions to the chief operator as to what happens if these alarm systems go off, what action he should take immediately, and what later action he should take to recover full use of the system after the malfunction has been repaired.

7. Another section of the chief operator's manual should contain home phone numbers and how he should determine whether to call for assistance or not. If a junior employee is performing the chief operator's duties, he may be reluctant to call for help until he has tried to solve the problem himself and wasted several hours of time. Levels of emergency should be clearly defined and a phone list should be prepared for his use so he can call various managers when he needs them.

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8. Every page of every manual should have an originators initials and date of creation in the lower right hand corner. Thus if there is any question as to what the statement means, the originator may be contacted. Furthermore, the dates will help assure that the pages in the manual are kept in harmony with the changes in the facility.

9. Each of the machine consoles should have a current operator's manual describing all of the operator actions which should take place at that station. One chapter of this manual should cover cold starting the system after maintenance, another warm starting of the system, another normal operation, another should cover routine activities (such as checking that Model 67 terminals are in fact active when they have been logged on), another periodic activities (such as running SMF programs in the wee hours of the morning), and another concerning those minor emergencies and malfunctions which a single operator should be able to tolerate at his console without disturbing the remainder of the system.

10. All manuals should be prepared with detailed indexes to them and the detailed indexes should contain both the official name and the colloquial name for each activity so that an inexperienced operator can find his way through the manual expeditiously.

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11. We urgently need a separate manual for the tape library describing all of the activities of the library crew and the procedures they are to follow in degaussing tapes, cleaning tapes, logging tapes, destroying tapes, maintaining tape inventory, authorizing users to compartmented tapes, etc.

12. The Computer Processing Branch Chief should prepare a notebook to guide his own duties. He should oversee the work of the computer facility crew chief to make sure that his checklists are up to date and are being followed. He should periodically review the chief operator's manual to make sure that it is current and covers all of the problems he can anticipate. He should periodically perform a physical inspection of the computer facility and make sure that it is clean and that the vendors are doing their part to keep the shop tidy and to increase its reliability. He should periodically check the cabling layouts against the power panel markings, the operators' run books, and the 2914 emergency switching instructions. He should personally inspect the air handlers to make sure they have been maintained recently and that their filters are clean. He should join with vendor maintenance personnel and make spot checks of the equipment to ascertain its cleanliness, general appearance (inside and out), and to determine if the air filters internal to the equipment have been recently changed. He should play the

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role of an acting chief operator and make sure that the markings on the power and cooling instrumentation are present and legible. He should review the computer center access lists and question any names he feels inappropriate or the names of people who may have transferred to other jobs and hence no longer need access.

13. In performing the above inspection, the Branch Chief, or his alternate, should not hesitate to suggest changes in the software if these will ease operational problems, to add programs to the software test tape, to modify or add to the checklists maintained by the systems crew chief, to add new sections to the chief operator's manual, or to bring up items for the Configuration Board to discuss. In short, the Branch Chief must truly run the computer center to carry out his responsibilities.

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Manager Skills and Personality Details

1. As noted in the summary report, every key manager within the computer operations chain is unseasoned in the job he is now holding. Most of these managers are bright and given sufficient time, appropriate education and some training, they will become proficient in the jobs they now hold.

2. Elsewhere in this report I have recommended that we stabilize the shop and slow down the introduction of change. This should ease our management problems significantly. Our managers are now constantly being bombarded by new programs, procedures, configurations, and systems even before they have the previous systems thoroughly assimilated.

3. In addition to slowing down the introduction of change, we had better learn to live with what we now have. Each manager should enumerate the activities and assignments he thinks challenge him most or point to the areas where he needs the most help. He should take that list of subjects to his immediate superior and jointly they should discuss how best to get him trained so he feels comfortable in his present job. In some cases there are people within the Agency who can assist him and perform that training. In other cases it will be necessary to visit outside establishments.

4. Where it is necessary to visit outside, an agenda should be prepared in advance which contains specific topics to be

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discussed. Initial contacts should be made with other agencies and private companies likely to face the same problems due to the fact that they have the same size of equipment, the same hardware, the same software, or the same working environment. When contacts are made with these outside companies, the agenda of specific topics should be discussed over the phone. If the company does not have something specific to say on the topics of interest, forego the visit and select another company.

When the companies have been selected, forward the agenda in advance and send two men on the visit: one to carry on the discussion about the topic and the other to keep notes. It should go without saying that any written documentation that can be obtained should be acquired during these visits. Upon return from such a visit, a trip report should be made to indicate what was learned, who was contacted, and how this contact might be beneficial to other members of the Agency.

5. Several times in this attachment and in other attachments a systems crew chief has been mentioned. This person should answer to the Computer Processing Branch Chief and furthermore the hardware planning group under [redacted] STATINTL should also answer to this man. Thus the Branch Chief will carry on the direct relations with the hardware vendors on

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routine matters, perform the hardware planning, deal with facilities support, and have a crew chief charged with maintaining the integrity of the entire computing system.

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6. [redacted] has continued his Tuesday system meetings and these have gradually become more computer center planning meetings and less 195 trouble meetings. This Committee should be formally chartered with representatives from software, customer services, computer operations, and the systems crew chief mentioned in the previous paragraph. In addition, all computer vendors should be invited. If IBM can supply a person who is cross trained in both hardware and software, he should be the

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IBM representative. [redacted] should be the chairman and they should work on advanced planning, the management of change within the facility, specific problems brought to their attention by any committee member, and then select recurring problems which may be indicative of a trend or require long term solution. (The one of a kind problems should already have been solved by the crew chief and the specific personnel involved.)

This is a change in that the short term incidents should be turned over to the crew chief for solution, whereas the [redacted] STATINTL

STATINTL [redacted] Committee should address themselves to planning and longer term trend analysis.

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7. I have never seen another facility which has consulting and job setup in the same work crew. When I broached this subject I heard many discussions of how these two teams interacted and supported one another. However, I would like to dispassionately reopen the subject.

We don't seek out scheduled production jobs so consequently we don't have very many. Many locations have 50 or 60% of their workload which is routine production jobs. These jobs are scheduled and set up by technicians specially trained in JCL. The technicians keep run books to determine how to set up the jobs, when to schedule them, and how to perform quality assurance on the output. They get quite adept at these assignments and perform them routinely and reliably.

The consulting function takes quite a different form. Most shops have some open-shop programmers and these require some person in the central facility to "Mother" them. Along with one or two Mothers, there are usually some troubleshooters to help people solve tough problems. In addition, there are some senior applications analysts and designers who can be called part time to review a customer's design or to help him in negotiating with a contractor.

Lockheed has a group of three people who constantly seek out large long running jobs and try and tune them to improve their performance and reduce their costs. Chemical Abstracts

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Service has a group of maintenance programmers who assist the operations chief by making non-structural changes to production computer programs to make them easier to run or to tune them to keep from tying up so many resources.

STATINTL I spoke to [redacted] about monitoring the ABEND data and seeking out users who seem to be in need of assistance. We have no users manual so there is no way to advise the user of best practice even when we know it. We have no awareness system so each user is left to learn on his own even though there are those of us in the central facility who are pretty much informally aware of our users needs and sometimes can call new techniques or new programs to his attention when we see them written up in a magazine or hear about them in a conference. There is no central library so when a programmer gets out of

STATINTL [redacted] training course, he is left to forage on his own.

STATINTL Even though [redacted] has a small technical library, it's up to an individual in need of aid to seek out the library and see if there is some book or paper of interest.

In short, all of this is pretty ad hoc, and the size of

STATINTL [redacted] crew is pretty small. If I had my druthers I would assign the routine repetitive portions to [redacted] and give STATINTL

STATINTL [redacted] the liaison assignment and encourage her to exercise sufficient initiative to seek out troublesome programs and get them repaired one way or another.

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(Each application program that bombs out is just one more challenge to the system and the operations staff. Unless we identify these programs and gradually work off our backlog of troublesome ones, these will be a constant irritant to the operations staff and constantly introduce a level of instability into the operation. In the past we have had the RCA crew as a separate entity. With the release of the RCA equipment, these production jobs are beginning to be run on the 360 and their production and scheduling will impact the remainder of the 360 work if it is not done carefully. Further, when GIMS becomes operational, that will engender further production work. Therefore I urge we set up a production shop under Gene Horan to handle this routine business.)

8. The technical writers should be transferred to the Technical Services Branch. They are physically located there, and much of their work relates to software or customer information. If they are transferred they will receive better direction and closer supervision.

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9. [redacted] and I discussed in detail the strengths and weaknesses of some of the key individuals in his shop. I indicated to him that I had an analysis tool which could be used to determine if the job assignments were properly structured.

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A copy of that tool is attached. It is entitled "How to Tune An Organization." I suggest that [redacted] work STATINTL together and use this method to tune Gene's organization. I think we'll find that there are several activities which have been overlooked including the crew chief, the documentation, and some formal operator training.

I suggest that Fred then work with Ed [redacted] and apply STATINTL the same analysis technique to [redacted] organization. We'll find that again several activities have been overlooked, principally the planning function and a broadened definition for customer services as described in the previous paragraph.

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[redacted] should then apply the same method to their own activities to determine if all of the tasks normally throught of as being associated with the Division office are being accomplished. It is my belief when this is done, Fred and John will conclude that while everything they are doing is important, there are some things which are being overlooked, particularly related to reviewing technical work in progress, assuring that it has both long term and short term benefits, assuring that corners are not cut (particularly in documentation and training), and in acting as a technical conscience for the Division both on internal projects and with respect to external activities such as PACES and mass storage.

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When the time comes to sit down with [redacted] and STATINTL review the plans for installing SIPS, the little analysis technique may once again be useful to review the responsibilities of [redacted] versus the data base managers in each of the remote locations.

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To use the procedure one first must determine what all needs to be done and then assign each activity to a branch or the Division. If the analysis is taking place at branch level, after a complete and exhaustive list of branch activities has been obtained, each activity must be assigned to some organizational element and a responsibility code must be entered to determine whether that supervisor a) has full authority, b) initiates action, c) makes recommendations, or d) assists some other activity which carries the primary responsibility.

10. We have several people in key slots who are weak. This can either mean that the individual is at fault, or the job is inappropriately structured. By performing the analysis recommended above, we can try and structure jobs so that every activity is assigned and that the persons performing a job are qualified to undertake them. In some cases that happy combination will be impossible but we will clearly know where deficiencies in our organizational staffing exist.

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11. If Recommendation 9 is followed, we'll have a set of assignment matrices for the Operational Division. These assignment matrices should ease our problems with promotion and turnover and allow us to consciously retune the organization whenever a change occurs. In so doing, we can consciously avoid overlooking an important activity.

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Vendor Relations Details

1. At the present time everybody is trying to manage the hardware and software details in the shop and in doing so has made the vendors feel they are not totally accountable for their actions. To cure this, several simultaneous steps will be required. First, the Configuration Board will need to worry about matters of strategy, the gross management of change, and checklists to hold quality in the face of change. STATINTL [redacted] Committee will need to address tactical matters including planning in detail and documentation to reduce the risk of a slight failure becoming a catastrophe. In addition, they should analyze the incident log and the SMF ABEND data and gradually start eliminating troublesome hardware, software, switches and application programs from the center. Finally, the systems crew chief (a new position answering to STATINTL [redacted] will monitor the day to day relationships with the vendors and the hour to hour support we get to counter the incidents we log. Finally, the Division office will monitor the accounting data, match that against the invoices we receive, and deal with the vendor's sales personnel concerning availability and quality of service over the reporting period.

2. Living in close and confined space as we are, the crew chief will need a set of housekeeping standards for the vendors and must enforce these standards to insure that the shop is kept

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clean, that unnecessary gear is promptly removed from the computer center, that external (or even off-site) storage facilities are used where appropriate, and that the shop is generally maintained ship-shape. However, this is just the first of many relations with the vendors. While IBM is the largest vendor supplying equipment to the center, they are not by any means the only problem. Equipment, loose parts, tools, manuals, dirt, filth, cables, covers are not the sole province of IBM. All vendors can and should do better.

3. Whenever a period of preventative maintenance is scheduled on any machine, the crew chief must review the equipment configuration and should ask the vendor if there are any Engineering Changes (ECs) that are outstanding against any devices which are hard wired to the system. If the answer is yes, then it is a reasonable request for one or more vendor personnel to be working on one or more boxes simultaneously and then to check out their equipment changes in series.

It should not be necessary for the Agency to schedule block time for each vendor totally independently nor should it be necessary for the Agency to schedule block time so that a vendor can install ECs serially.

4. The Agency must zealously avoid trying to manage the vendor's work force or trying to interfere in the internal

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operations of the vendor. However, the Agency must simultaneously insist that the vendor keep us informed as to what is going on, just as we should plan to keep the vendor informed as to our plans (by making them members of the planning committee chaired by [redacted].

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5. One improvement in vendor relations will be accomplished if the Configuration Board undertakes to define what we expect from a vendor and in return what we will give a vendor (information, dollars, opportunity, etc.). If the vendor interface is so defined by the Agency, we can then negotiate with each vendor and determine if the interface as defined is satisfactory. This will put all vendors on an even footing and IBM will no longer feel that they have been singled out. After the vendor interface has been defined, we should compare our definitions with the standard GSA contract. If there are deficiencies in the GSA contract, we should then propose changes so that all Government facilities will benefit from our pioneering.

6. Once the interfaces are defined, we should document all agreements in writing. The memos to file should be written in a quiet, unemotional tone so that they are neither accusative or defensive. However, if we agree to periods of service, to review engineering changes when they are received, to delaying

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service for certain periods under certain conditions, all these agreements should be down in writing.

From time to time these memos should be accumulated and codified and published in a document entitled "Guidance for Vendors." Thus all vendors can compete for our business from the same basis and the service we receive from each vendor will be identical.

7. In the past the working level members of our staff have dealt with the vendor's people directly without having the benefit of a series of interface agreements established by our top management and vendor top management. Consequently from time to time our working forces have found themselves antagonists with the vendor personnel. As a result our working relationships have suffered and eventually our service has suffered. Most of these arguments have centered about who is responsible, the levels of service expected, and the quality of work. Most of these confrontations could be avoided if we let management set the policy and the work force carry out the activities.

8. The structures of our meetings could stand some improvements also. I mentioned to [redacted] that we need severity codes on the incident log. I sat through one dull meeting where all incidents were treated with equal severity. Clearly a single

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occurrence of a minor incident should be recorded as a statistic for management and resolved at the lower levels. Obviously all recurring incidents and all incidents of major severity should be called to management's attention. Further, any incidents of significance or any trends should be presented at a joint meeting between Agency and vendor management.

9. It does not appear that we have carefully challenged each person with problems he can handle. Immediate details are best handled by workers and policies best handled by management. To fail to structure the relationship is a guaranteed exercise in frustration.

10. We don't have much control over the individuals assigned by a vendor to our account. However, in the event that we have individuals on a vendor's team who react with individuals on our team like flint and steel, we should take some administrative action to keep these individuals from coming in constant contact with each other. Some people are unable to suppress their personalities and get on with the job. If we are cursed by this situation, we should try and avoid the problem in the interests of harmony and good vendor relations.

11. As soon as we have severity codes on the incident logs,

STATINTL [redacted] Committee should then address the problem of how to

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estimate or account for the total time lost in recovering from an incident. Obviously if we lost a 2741 terminal, that is an inconvenience. If we lost the 195 and have to cold start ASP, that's a catastrophe. If in cold starting ASP we have to re-build some data sets, that's a major catastrophe.

If we assign severity codes to our incidents and if we try and account (or estimate) the total costs of each incident, we can report to the Director of Computer Services once a month: the total incidents, their severity, and the time lost by causing organization. He can then use his discretion and pass these reports on to the vendors or not as he sees fit.

There are some indications that the vendors may not fully understand the impact their personnel have on our operation. While we could insist on their people being better trained, exercising more initiative, and being smarter, to do so would imply that we were managing their end of the business. However, to give them a monthly report card on how they did would merely mean we were grading their performance in consonance with the interface definitions described above.

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Policy and Standards Details

STATINTL 1. I read the paper published by [redacted] earlier this year describing the interests and involvements of the reconstituted Information Processing Board (IPB). Those things as enumerated sounded well and good, but they presume a stability in the main computer center which it does not have. I submit that there are several activities which have been overlooked and I urge the IPB to pause long enough to take care of these oversights.

2. First, there is no codified body of policy to guide computing within the Agency. There are a few guidelines set down by White several years ago, but they were not totally adequate at that time and they're clearly not appropriate today in the time of remote terminals, centralized data bases, monster computers, and inexpensive mini-computers. The IP Board needs to have a charter and that charter needs to allow it to set policy covering standardization on just a few types of mini-computers, requests for on-line terminal support and on-line file storage, justification of new applications, and specifications for statistical reporting from our various computer centers.

3. I would have the IPB declare that each computer center should have a users manual and that where possible the users

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manuals should be identical when the same work is being done with identical hardware and software.

4. I would also have the IPB declare that there will be a set of standards drawn from the users manual and these standards will be absolutely binding on all open-shop programmers, all internal users, and all contractors. Further, that any exceptions to these standards are to be approved by the IPB. The standards should be made part of every bidding package and each contractor should be required to state that he plans to adhere to the standards or specifically request exceptions from the IPB to certain standards.

5. The IPB should charge OCS with maintaining a lending library covering computing and computing matters and should assign OCS two additional headcount so that library can be maintained in a central location for the benefit of the Agency.

6. In addition, the IP Board should direct that each center maintain standard statistics and measures on each vendor so vendor performance can be compared and so inept vendors can be weeded out.

7. The IP Board should charge [redacted] with preparing STATINTL a plan for linking the computers within the Headquarters and

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upon receipt of that plan should then determine the conditions for its implementation. Specifically, if that were done and if the goal were to link the computers so "workload may be shared and common files may be accessed," then a reasonable plan would be one which faced up to the problems of common security procedures, common priorities, common operating systems and job control, and common application programming standards.

These in my opinion are all prerequisites to linking the computers with copper wire. The cable linking of the computers is the last step to building a network and not the first. Further, if work is put on programming standards and users manuals, this will be doubly rewarding since it will enhance the stability of the present shop and will also provide the foundation for eventual cable linking of the three facilities.

8. As a prerequisite to making policy for the various workloads, we should establish some workload/environment classes so that the policy and the standards are drawn appropriate for each class. Obviously it is inappropriate to make a set of standards binding on unclassified batch work which are the same as the standards for high priority on-line activities related to the mainline mission of the Agency. This distinction applies throughout the entire computer community to policy matters, to standards, to work justification, and to the metrics of service levels.

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9. The Internal Auditors throughout the Government (and the Agency is no exception) are belatedly recognizing the impact of the computer on their profession. They are very interested in defining how they fit into the new world of computers which involves on-line terminals, remote job entry, and data base systems. The IPB should recognize that the Inspector General and the Internal Auditing workforce do occupy an important place in the scheme of things and prepare some policy so that audit participation is guaranteed in system design, during system test, and as systems are installed. The auditors, in turn, should prepare checklists to guide their actions at these milestones. It does an auditor no good to find out that an inept system has been constructed and that he should have been involved 17 months earlier. Only through proper policy and guidelines can his early participation be insured.

10. Since our workload has "unexpectedly" doubled in the last year or so, it is obvious that the Agency needs better workload forecasting mechanisms. The IPB should instigate a review of our workload forecasting problems and should institute an appropriate system which will give the computer center as much notice as is possible as to changes in the workload. This mechanism will allow the IPB to testify to senior management that

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unanticipated changes in the workload have in fact occurred and thereby assist the computer center in gaining necessary additional equipment and/or headcount.

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Staffing Detail

1. It is difficult to get a clear cut view of the staffing of the center without comparing the Agency with other centers of similar size performing the same function.

As was described in earlier attachments, I anticipate that there are several activities which have not been assigned to either the Computer Processing Branch, the Technical Services Branch, or the Division office. As described in Attachment #5, we should enumerate all activities and make sure that each activity is assigned to someone. When we do this I suspect we'll find some new activities and as a first step will attempt to acquire some new people.

2. Prior to attempting to achieve increased headcount, I suggest we review what we are doing now with the headcount we have. We seem to spend an enormous amount of time in unstructured meetings without agendas. I feel sure that at least a portion of this time could be better spent in more productive efforts.

Some of our people don't write very well and as a result spend unwonted amounts of time laboriously writing; or if they dash off a quick memo, it contains errors of English or fact and causes consternation throughout the remainder of the shop. Perhaps some directed reading in technical writing could assist some of those people. We should review the assignments given

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to the technical writers and see if the programmers are providing copy of sufficient quality and content before the technical writing process begins.

We have five computer technicians and we should review their activities thoroughly to see if we don't have about three too many in these assignments. We have three employees and one contractor in the hardware section and it looks like one or two of these men are carrying most of the workload.

The way the shop is presently configured, with all the work we've got to do, and with the manuals of procedures that are absolutely missing, I didn't see any other employees whose job assignments should be reviewed.

3. On the other hand, we have a monstrous technical writing chore before us. We have a programmers information and awareness function which is not being done. We have a customer services section which should be more outgoing. We have procedures to set up to accommodate scheduled production work. We have planning for projects such as PACES and mass storage which has been skimpy in the past. And we have the big on-line GIMS system which is going to require additional manpower (and more importantly additional supervision) until it gets set up and runs smoothly.

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On top of this we run weekends with overtime labor and on Sundays with only two employees in the entire shop. (Thank goodness, the workload was low also.) All in all, I strongly suspect that we can make some management changes and increase our efficiency, but we will still find that we are undermanned at the team leader and at the supervisory level in operations, and we are short a few computer technicians for the work we have to do.

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SECURITY NOTES

1. As may be implied by the discussion on page 10 of the summary report, I don't believe in gross group accountability with [redacted] STATINTL in the accountable group. It should be possible to narrow the group down significantly and to place some restrictions on the access.

2. [redacted] STATINTL and the PACES accounting system must produce a dataset access log which logs all accesses to tapes and disk files. After the accesses are gathered together we must compare the programmer name and the project identification with the master library access list and flag all accesses that are not consistent. (This is a necessary prerequisite step if [redacted] STATINTL mass storage ideas are going to be adopted anyway.)

3. Every file dumped in the shop must be treated as if it's classified because the job may have been processing classified data when dumped.

4. Since we have some permanently resident files that we wish to leave on disk we must put an IPL counter on the IPL button on all machines which can access these disks so it is not possible to load a stand-alone utility and get a disk dump.

5. On the weekends we have vendor maintenance people and programmers who operate the machinery without supervision. If this is to be allowed to continue, we must modify the disk drives so they cannot be unloaded unless a key is fitted into a lock and the drawer is opened. In addition, there are on-line and off-line switches on almost every device. Whenever we are getting ready to give up a machine for maintenance that has classified materials stored on its disks, we should throw the switch to off-line and lock it in that position (through the addition of a small plastic cover and key lock). The other alternative is, of course, to dismount the disks and this would cause us additional reliability problems.

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I know this solution is not totally foolproof because a knowledgeable maintenance technician can bypass these simple locks I've just described. However, the simple locks will prevent accidental errors and will require a malicious person to get deeply into the equipment to bypass the features noted.

Quite a bit can be done with lead seals and wire if we make it a standard policy to inspect these seals before and after we give these machines over for maintenance.

6. We must get a shift chief's manual prepared which describes all routine emergencies, we must shackle the system programmers and make sure that no system changes are made without updating this manual. We must similarly shackle the hardware staff and the maintenance engineers to make sure that this manual is constantly current.

7. We need a separate book of procedures to control the work force that mans the tape library. These procedures should cover all our normal conditions and actions, and there should be a separate set of procedures for abnormal activities. In addition, special care must be given to the manipulation and control of access lists and ownership files.

During my survey we found the tape ownership listings to be readily available through the open window on weekends and then we further went to find that the file from which the listing was printed was on a public disk pack. Steps have already been taken to remove that file from the public disk pack and to keep it only on tape. This is a very precious control file and should have been treated as sensitive material.

8. There are some compartmented tapes that are given special handling. These have access lists which contain the names of individuals. Our practice has become sloppy and the tape library people add names to these lists by hand.

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writing additional names in, therefore bypassing all control. A procedure should be set up so that Jules has these lists typed and that Jules maintains the list and that the only list used by the tape library is a list which has an original signature of Jules' on it (no xerox copies). If this is done it puts Jules back in control of the access to special compartmented tapes.

9. I don't think sealing the ASP-OS/MVT operating system against malicious attempts at penetration is possible; however, I believe we should give serious attention towards reducing the probability of accidents within our system even though it may mean some patches to ASP to do so. I believe [redacted] STATINTL should do a study and then Brian and Jules should discuss that study carefully to determine how difficult it would be to cause ASP to carry a security code on the job card for each job; and if the security code is other than unclassified, to cause ASP to erase core spaces and disk spaces before assigning that space to a subsequent job. NSA had a time sharing system put together by

STATINTL [redacted] several years ago which did this very well. The concepts are well known; I'm just not sure how much work it would be to put some of these features in the ASP and to cause ASP to insert appropriate job steps so the same functions could be introduced into OS. It would take a little extra computer time during execution, but I would feel much more comfortable if an unclassified dump didn't contain classified information from the previous program.

10. We have a serious problem with permanently mounted public disk files on ASP. ASP lacks controls to perform password or authorization checks prior to giving access to disk file, so here we stand with a shop which carefully checks passwords and authorizes access on the model 67 time sharing system

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but once a job gets passed from the time sharing system to the main batch system, it has unlimited access to any files that may be mounted. Obviously, if the PACES records log out accesses after the fact and if we process that data regularly, we'll know who accessed the data sets that was not from the office said to own the data set and can follow up on it; however, that would steill leave us exposed for a 24-hour day and would further leave us exposed to machine malfunctions, restarts, and dumps.

I don't see any choice but treating all dumps as if they are classified because there is a very high probability that they contain classified information.

11. As mentioned in the summary report, the clutter and general mess in the machine room makes the operators and fanitors and clerical force error prone. Nowhere is this more apparent than in the little room next to the model 20's which is used for bursting, loading film, and logging work out. That work room ought to be cleaned up; it should not be used for dead storage. All the program decks should be made the responsibility of [redacted] as STATINTL Chief Librarian, and if we need additional shelves, we ought to install them so that there is a place for everything, and everything is kept in its place. That would make it not only a better place to work, but would reduce the possibility that accounting and payroll information might get mixed up with something else, permitting accidental disclosure to people who have no need to access administrative information.

12. The communications patch panel contains the ability to listen in on communications traffic. We have some encrypted lines which implies that the traffic is classified across those lines. Frequently the wee hours of the morning and idle hands lead computer operators to mischief. Therefore, I

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suggest a plastic cover be manufactured to cover the communications patch panel and put on combination locks so the patch panel cannot be opened without the shift leader opening the lock. If this is done, then an operator won't be prone just to patching in on a line just to see what the traffic looks like and getting information he should not have.

13. Our tape library has no records retention program (even if we did, it wouldn't work since we don't have our manual of library procedures). Many of the precious records of the Agency are stored in that library. If something happened to that library, be it natural or manmade calamity, the Agency would be severely, severely disabled. Most large commercial and industrial firms have decided not to take that risk and proceeded as follows: they have identified all their very critical files. As those files are normally updated, instead of scratching the grandfather tapes, they ship them to another vault off the main site. On the following update cycle, the new grandfather tape displaces the old grandfather tape, and at that time it is degaussed and put back into service. Thus if the tape library were destroyed, or the contents of the tape library were damaged in any way, a tape with almost the correct contents (not quite current) would be available at the alternate site. For instance, the IBM Corporation routinely and regularly sends grandfather tapes to a records retention center at Iron Mountain, Vermont (at least I think it's in Vermont), thus if they had a riot or a fire, extensive water damage, or an earthquake, they could go up to Iron Mountain, retrieve the tape which was no more than a week old, and rebuild their files from it, and all the current transactions they could recover.

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If a records retention program is installed, you've got to make sure that the records retained constitute a critical mass, thus you must have copies of your software, copies of your application program library, copies of the operators manual or instructions, copies of the private disk files, and copies of the critical master tapes to make this properly work. I've seen shops that saved all the materials except the operators instructions and found they couldn't run at the backup facility because nobody could remember what the job codes meant!

14. I define security to encompass more the protection of information from alien eyes or access to the computer center. I include in my personal definition of security the desire to protect the entire computer center from accidents or penetrations which could reduce or strangle its effectiveness in support of the Agency mission. Therefore, as part of my security and integrity audit, I looked at the support systems around the computer center and found them grossly wanting. Specifically, the wiring in the power substation has a temporary look and appears unsafe and likely to be troublesome in the future. I found no procedures in the power distribution center for coordinating powering up of the motor generator set and the computer in the proper sequence. I found that we exercise the diesel generator set, but we never actually isolate the computer from the remainder of the building load to prove that the computer will run off the motor generator set and that the building isolation circuit breakers do in fact work properly. I've found our air conditioning systems without documentation and without procedures to coordinate the air conditioning equipment power up from scratch after the building had been darkened. I found no maintenance records in evidence on

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either the motor generators or the air conditioning equipment. I found general untidiness and mess everywhere. I found a water leak dissipated by a garbage can lid to protect an electric motor in the air conditoning system. I found dials and gauges without the normal ranges being marked by a green arc. I found underfloor smoke sensors without instructions as to what action should be taken when they went off in the computer room and without labels to know that they are even smoke sensors. I found water lines with valves which were either inaccessible or unmarked or nonexistent so we can't drain the water system in the event we have an air conditioning leak. I found no known way to shut down the air conditioning system in the event a water lead occurred. I found underfloor water sensors had recently arrived, but even when we install them, we don't know what action to take. I found the air conditioning compressors had automatic cutover circuitry but there were no anunciators to allow our machine room people to know that we were running on the backup set and hence to follow up on service for the primary set. I found the lack of a book of emergency procedures in our machine room appalling. If we had all power go down and had to cold start the system on the weekend, we don't know how to do it. If it occurred during a hurricane or storm emergency or snow, we might not be able to get the key technicians in. All of this could easily account for 2 to 4 hours worth of downtime, due to a small power failure. Most of our communications and troubleshooting depends on the ability to locate a key guy by telephone. If we had a sleet storm and it was the sleet that knocked down the computers, the sleet might also likely knock the telephone down. Therefore, we'd have people manning

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the computer center who didn't know how to operate and they would be cut off from their sources of knowledge. We urgently need to document the computer system, the air conditioning system, and the power system, and to recheck that these systems can be cold started by weekend personnel, and can be cycled down in the event VEPCO gives us some advance knowledge of power failures. We need to make sure that all of our air conditioning and power equipment, both within and without the computer, is properly serviced. We must exercise followup to make sure that those service technicians do in fact perform their duties properly and on the desired schedules. We must get our emergency lights installed properly, we must check them regularly, we must mark all the power panel doors with the name of the circuits they control. We must put identifying numbers on every power panel door; we must take every computer box and put a placard on it as to the power panel which controls it. We must get rid of the magnetic plates that our holding our power panel doors closed and reinstall the regular handles on them. We must take the cover doors off the fire extinguisher cabinets so the fire extinguishers are more accessible. We must put plugs on the water lines where the fire hoses have been removed. There is at least one case of shoddy electrical wiring in the overhead right above the console for the 65/2. There is a conduit which is three inches short of a junction box, yet they ran the wire through it anyway! Our new expensive electric clock system is running off of temporary power and laying on top of the computer rather than being permanently mounted to the wall.

15. All of these things make the shop more cluttered, less like a taut ship and more unforgiving so that a slight human failure can escalate into a major problem.

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We have had several power air conditioning changes, and I could find no one who could tell me what the emergency power-off and emergency air conditioning switches near the main entrance did to the computer center. We must be sure that the switches still shut all the systems down, as one might suppose, and we must put the descriptions of these actions and the complimentary actions as to what should be done to recover from them in the emergency book prepared for shift operators. There is an audible alarm mounted on the 195 cooling flow panel in the main machine room which has been disabled for some weeks because it sounds even when the flow is adequate. We've got an old temperature and humidity control set of instrumentation and a new set of air conditioning, temperature, humidity instrumentation, both installed, and neither has been disabled or covered up. Consequently, the operators don't pay any attention to either one. The old system must be stripped out of the facility and the shift leaders must be instructed as to the procedures for monitoring the current air conditioning equipment instrumentation, and furthermore what actions to be taken in the event the instrumentation indicates a malfunction.

16. The rooms where our air conditioning and power supplies are located are equipped with standard hotel-type doorknobs. I believe they should be locked more securely. I believe motion sensors should be placed in these rooms, and I believe an annunciator panel should be installed next to the "point" in the main computer center so that whenever there is any traffic in the rooms, or whenever there is a malfunction in these rooms, whenever the alternate equipment is being used, that the annunciator panel indicates this to the shift chief, and he can see about getting service or follow up on who is doing what to our sources of power and air conditioning.

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17. I have clearances and was given access to the computer center; however, under no condition was I ever required to produce any identification to get this access. I met ladies in charge of the control point and on the weekends I met operators in charge of the control point, and all I did was to state my name and they gave me a card to sign with my name on it, and they issued me a yellow badge. I didn't detect anybody checking that the number on my personal identification badge was the number on the card giving me access. If that check is not installed, it is one we should install so they could identify me by my picture and then read the number from my badge and when the number matches with the number on the card, give me access provided I have given the correct name.

In addition, sometimes I signed in on a yellow card and sometimes I signed in on a green card, and it didn't seem to make any difference because I always got a yellow badge.

18. When the programming standards are set for the computer shop, for security purposes I would legislate against assembly language coding and would take the assembly program off the systems residence device. In addition, I would legislate against any changes to the system software, any applications SVC's, and would legislate against any application program running in the supervisor state.

In the event a project could prove a hardship and therefore require an applications program with modules written in assembly language, I believe the applications programmers should submit specifications for the assembly language modules to [redacted] Customer Services people, and that we should write the assembly language modules for them! Only in this

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way can we be sure that an application programmer does not seize control of the system and violate any security checks we may install in it.

19. I don't understand the fetch protect problem in this shop. I thought fetch protect was in one of the OS releases provided we had the fetch protect hardware.

STATINTL Unfortunately, I didn't get to ask [redacted] about this to find out whether our fetch protect problem was due to lack of hardware or because we made some modifications to OS, or maybe my information is just wrong. But I sure wish we had fetch protect to keep the individual programs from reading each other's memory space.

20. If I were really going to do a fair security audit on the center, I would start out by defining the kinds of threats to the center, assessing the probability that each of those threats was going to be real, and then looking to see what counter actions should be required for the threats which seem to be significant. Obviously, I'm not much concerned about the introduction of nuclear weapons into the facility or the facility being overrun by foreign power. In the questions described above and in my look at the center, I've been more concerned about errors of machines, software programs, or humans which lead to security slip-ups.

21. In two separate cases during my two-week visit I found unclassified documents which contained classified information. The underlying problem is as follows: When information is spread out in bits and pieces, it has very little value and tells the alien world very little about our operations or our plans; however, in both of these cases, large amounts of information were concentrated into a report, so that by reading the report one got a very good overview of what we had or where we were going and therefore could not ascribe importance to several of our actions. Both of these cases were called to Jules'

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attention. I imagine this is a life-long challenge for a security officer here at the Agency, because he must constantly indoctrinate people that while little bitty bits and scraps of information are in themselves not classified, collections of these scraps tell a rather interesting story.

22. I saw some documents which had been Secret when they were zeroxed and a black magic marker had been used to declassify certain portions of them. This is not an acceptable technique for declassifying documents because the original print is very legible provided the light shines on it at the correct angle.

23. There is a special fire door which had been fitted to the access window going into the tape library, but this has been rendered inoperative by the construction of the shelf. This work must be redone and the fire door should be hung from the top so it can be closed by gravity during the emergency, and a method must be provided for tripping that fire door when an emergency occurs.

There is a second door on the inside of the window and it has a dead bolt on it so that if someone wanted to close it in a hurry, he must walk over to it and move the bolt. This also should be fitted with a snap lock and a spring to close it, so it can be closed automatically during an emergency.

We have moved an emergency battery operated light into the tape vault. This light must be permanently mounted on the wall for the protection of the people working in the vault.

24. We must make the tape vault doors so they will close automatically when a handle is pulled. Therefore, if the room were evacuated in a hurry, the handle can be pulled and the vault slammed shut as the last tape librarian evaculates the center.

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The tape vault has a wet pipe sprinkler system in it and no floor drains! We must put drains in the floor to get rid of the water in the event the sprinkler should go off. We must waterproof the ramp so the water from the tape library can't run into the machine room and get under all the cabling running to the machine, and I would urge that we convert the fire deluge system to a dry pipe system where the dry pipe is charged when we slam the tape vault doors.

27. On weekends programmers get direct access to the card readers and can run their own decks and carry those decks away with them. Until the PACES dataset access list is implemented as described above, this gives us a security exposure as a programmer can drop in a deck which requests access to a classified file stored on a public disk and can get that access without anyone knowing it. There were even instances during the weekend when programmers were running printers so it would be possible, if one were just bold enough, to run a deck in, get access to whatever he wanted, and to print it back out. If one knows the office, the project and tape number, he can even call for a tape out of the tape library, get that tape hung without question, and the program can access it. Thus, on the weekends, our only protection is the fact that the general public cannot enter the building itself.

In a separate section I'm urging the software teams to prepare check lists and full documentation on all software changes and on all equipment moves. When this documentation is available, copies of it can be reviewed by

STATINTL a competent programmer such as [redacted] and we will at least have audit logs to show that the changes installed do not violate the security procedures we are trying to maintain. However, when a new operating system released

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is installed, such as ASP 2.6.5, Jules and Brian probably should sit down at a meeting and discuss with [redacted] and company what the new system does, what security it is likely to have, and then make sure that the operating procedures and procedural manuals are updated in the event the security aspects are unsatisfactory.

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26. We are waiting over a month for red stripes on every pole which has a fire extinguisher mounted on one surface. The red stripes are to be an indication that on one of the faces of that pole there is a fire extinguisher so that you can locate an extinguisher quickly, even though you may not be on the same side of the room as the extinguisher is hanging.

27. In the burster room next to the model 20, we sometimes keep carbon copies of reports. This is a questionable practice. I can see no reason why an extra copy of a secret inventory of Agency equipment should be in the cabinet in that room and retained by us for any purpose.

28. The model 67 time sharing system automatically enables terminals when it does a warm start (under the assumption that warm starts are done during the normal work shift). This is a security exposure since if one did a warm start for test purposes on weekends all the terminals would be enabled. I watched [redacted] run that machine and he seems to be pretty competent and I don't think he slips up; however, this is a potential exposure by less competent operators, and we might want to fix that software so it did not automatically enable terminals.

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29. On the weekends, we run with a very small operator force and the tape library door stands open. Sometimes only two operators are on duty and ten or more programmers wander around the machine room. I recommend that

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we put a motion sensor in the tape library, and on weekends that we lock the tape library window. The motion sensor should be enabled by a key carried by the chief operator. Thus the chief operator can enable the motion sensor when he is not near the tape library and can disable it when he is working in the tape library. We hold the chief operator responsible for the tapes in that library yet we expect him to busy himself throughout the shift running the machines. We must give him a motion sensor or some other security provision so we can control access to the library even though he might not be able to see the vault door.

30. If we decide to proceed with the cable linking project we will need to establish standard security procedures and standard security codings so that a job submitted to another computer center and transmitted to us will be treated by us just as if it had been submitted through our control point. When the emergency shift chief's book is prepared, be sure it contains instructions about properly warming up the 2301 drums in the event the system has been powered down for six hours or more ([redacted] of IBM knows the specifics about this).

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31. There is a patch for the ASP system which allows a 2741 terminal to automatically prepare tape labels. This has been installed several places. One installation is in North American Rockwell in Downy, California. It would be possible to prepare tape labels with security classification printed on them automatically by the computer. It would also be possible for the ASP system to store a record of the tapes so created on a disk file so that the tape inventory can be automatically maintained. If these two changes were put into ASP, our library management would improve significantly since we are now manually

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preparing tape lables (an error prone and expensive method) and after tapes are created we then hand tabulate the identifying information on a keypunch sheet which is later keypunched to update the tape library (more errors and manual effort).

STATINTL 32. The mass storage project being run by [redacted] is very important to Jack Iams; however, we must thoroughly audit the specification for that storage to make sure that it contains sufficient security procedures and that it contains sufficient audit trails, and that all of these audit trails, security procedures, and control files survive any and all hardware malfunctions of the mass storage device. In short, we need to audit the mass storage specification before bidders are requested to bid against it.

STATINTL 33. At the present time we don't have written statements of responsibilities for the various data base managers. [redacted] had some discussions along these points, but the complete package is not documented. This package should be documented, and Jules and Brian should perform a security audit to make sure that there are sufficien audit trails, that when files are rebuilt that the records are kept, and when the system malfunctions that we protect calssification properly.

34. At one time our payroll, accounting information, and the list of sensitive names were processed through the RCA equipment, and therefore isolated from the major job stream. As of the first of the year we are planning to run this data through the 195 under the control of the simulator. If Jules and Brian have not looked at the security risks attendant to this operation and the possibility of leak or malfunction (since we do not yet have fetch protection), this should be reviewed immediately.

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Future Notes

1. As can be detected from the summary report and the other nine attachments, the shop mainly needs an opportunity to catch its breath and bring our documentation and training up to professional levels. Thus I recommend a moratorium on change. However, change in a big facility is almost a way of life, and one can never stop it; one can merely slow it down. On the weekend of November 4th, we recabled some devices as the first of a series of five changes to be performed on five consecutive weekends. Obviously these changes were planned before my audit and with reluctance I recommend that they proceed.

2. We have already SYSGENed ASP Release 2.6.5. It has been thoroughly tested and its installation has been deferred until mid-November. It does solve some operational problems, but being a large change it will probably introduce others. However, considering the work that would be lost if we do not install it, I recommend that we proceed to install 2.6.5 and then freeze our operational hardware and software so we may document it and train to it.

3. The RCA equipment was scheduled to go out on the first of October and at the last moment we decided to retain it three months longer. However, at the present time we are planning to

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power it down on the first of December and see if we can get along without it for the last month it is installed. To further cloud this issue, there are some RCA programs which cycle on an annual basis and hence will be executed for the first time in 12 months during January of 1973. Also in January of 1973,

STATINTL [redacted] is going to a 16 week school in Massachusetts. All of these things conspire to cause us to look further into the release of RCA equipment and into contingency plans so we may execute successfully even though equipment may be physically removed.

4. For several years we have had a large task force working on the SIPS/GIMS-II. This system is scheduled for initial pilot operation on the first of the year and it will draw all available management talent at the machine-room-supervisor/computer-technician level to understand it, to operate it, and then to write operational procedures so others may understand it and operate it.

5. The Director of OCS is extremely interested in the installation of a computer accounting system known as PACES. His interest follows from a decision by senior management to start billing for computer services rendered just as if we were a commercial service bureau! I consider this to be a breakthrough in the operation of government computers and heartily endorse these decisions.

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STATINTL [redacted] has been assigned to coordinate the effort and I have recommended elsewhere (both verbally and in writing) that a member of the Tech Services staff work with [redacted] STATINTL in preparing a plan for the introduction of PACES. In a headscratching session with [redacted] STATINTL he and I enumerated a collection of items which were related to machine accounting. The following page enumerates those items and the arrows indicate their relationships. Obviously the introduction of a new machine accounting system will occur in phases. The first phase will perform usage accounting, the second phase data set accounting, and the third phase accounting in the on-line systems. A plan for PACES should be carefully prepared with estimates of effort drawn from the persons assigned to do the work. Since this matter is of such extreme importance and since the time is woefully short, it may be necessary to prepare two plans: one based on what we can accomplish with a reasonable effort, and the other describing what we can do with a maximum effort (plus an enumeration of those other things we won't do if we launch a maximum effort).

In any event, the shop is none too stable at the present time and the PACES system is likely to affect many software modules, a collection of operational procedures, and produce a whole covey of new reports. All of these matters should be defined in advance down to the details of what computing equipment goes in what cost pools and how those pools will be

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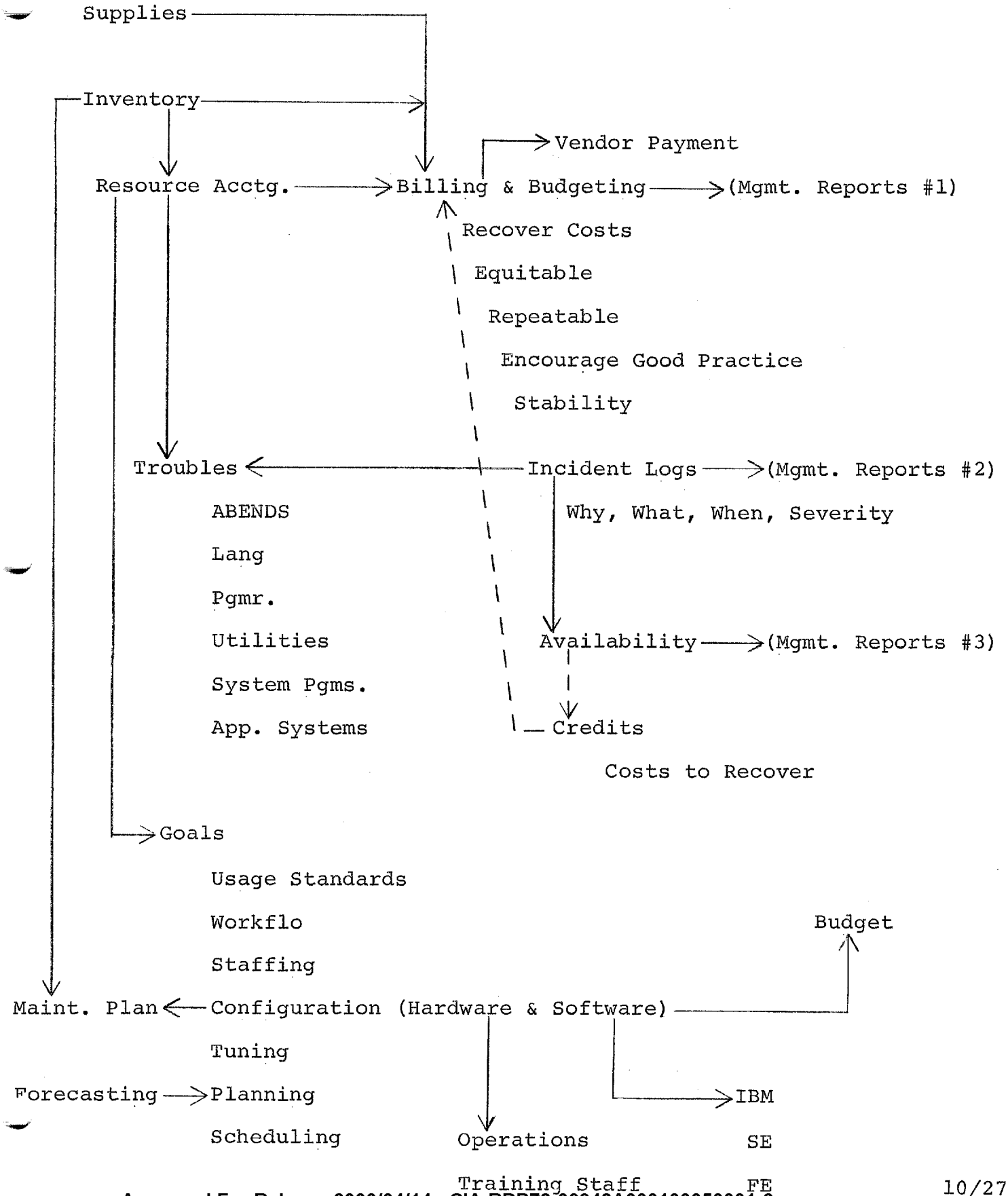
ITEMS RELATING TO MACHINE ACCOUNTING



Legend: ——— Current Needs, — — — Future Extension

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allocated to users. After all this documentation is done and while the implementation is taking place, briefings can be held for the Information Processing Board and then to key administrators and users organizations so they won't be surprised by the introduction of the new accounting system. All and all, the introduction of this new system requires careful planning and thorough review if we are to avoid adding instability to the shop.

6. As can be inferred from the previous attachment, I think the cable linking project is premature. We must first establish some hardware and software standards and then establish some operational standards governing priorities, security, and cost accounting before we are ready to worry about linking the computers with a piece of copper wire. Furthermore, as I described above, by setting the [redacted] Committee to work on STATINTL operational standards, we will be laying the groundwork for the linking, but at the same time will be establishing standards so that workloads can be interchanged and assure that programs developed by contractors fit harmoniously into the work developed locally.

To press on with cable linking as originally proposed will do two things. First it will put the cart before the horse and while we will be linked, no meaningful load sharing nor data

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access will result; and second, it will occupy a portion of

STATINTL Ed[redacted] time -- time which could be better spent on performing other activities which would render the shop more stable and reliable.

7. The mass storage project has progressed to the point that practical considerations should be introduced into the project effort prior to the time vendors are solicited for bids. The work performed to date as concentrated primarily on cost effectiveness assuming that our existing tape and disk usage is reasonable and justified. However, at the present time we have no library of procedures and we don't have the ASP patch which causes ASP to generate tape labels. Our library operation is still manual without standard data set labels and without the use of modern file compression techniques on large files. Thus we have a large number of magnetic tape drives whose utilization tends to be low because much of the time they are either being set up or knocked down and not actually moving tape.

In addition, we have a large number of disk spools and have yet to install any meaningful management controls over their usage. We don't charge for resident disk space, nor do we consistently purge disk files which have not been referenced in the preceding 30 days. (There is at least one case discovered during my survey where a file had been stored both on disk and

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on tape and was never used except by a once a day batch job -- clearly it should have been tape all the way.) With any management at all, we should be able to reduce our disk space dramatically. Some other clients have seen a reduction of 50% whenever purge was driven by lack of activity. All of this goes to say that justifying mass storage based on the tape and disk configuration we now have installed is to justify mass storage based on suspicious figures.

Until the PACES system is installed and then augmented by the data set accounting, we won't have good information on the number of tapes hung, the number of private paks mounted, and their usage. It is true that we could get that information today from the SMF tape, but at the present time we don't have good data. We need this good data and it all must be time stamped by the computer when it is recorded so that we can drive a decent simulator to test the model which describes the mass storage device we propose to acquire. Until good data set accounting data is available, the model can't be tested. [redacted] STATIN

STATINTL [redacted] is just now putting together the PACES plan, but it looks like data set accounting won't be available until second quarter 1973.)

In reviewing the mass storage work done to date, I found that most of the work done to date concentrated on the cost

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and effectiveness aspects of mass storage. We need a series of operator protocols so a) we know how to reconfigure the mass storage (or at least warm start it) whenever we switch ASP from one support computer to another, b) whenever we cold start the system, c) whenever we shut it down for the weekend, d) whenever we pass the responsibility for the tape library from one shift chief to another, e) whenever we wish to restart a job which has successfully executed several of its job steps. In addition, we need to look at the problems regarding passing files from job to job, having in the system multiple files with the same name but of different creation dates, purging the system of files created when a job bombed (yet will be recreated when the job is started once again), etc. All of these things I call operator-library protocols. They are legend in the management of tape libraries and must be specifically enumerated. Those protocols which will perpetuate after mass storage is installed must be specifically accommodated in the mass storage spec.

Further, the mass storage device must be specified so it can operate inside a fire-proof vault or it must be built in its own fire-proof cabinet. For a mass storage device with the capacity of the one we are contemplating, almost all of the precious records of the Agency will be stored within it.

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We must protect these records from fire, water, smoke, or other calamity. If the device is to be installed inside a vault, we must describe its physical size and cabling so it can be moved through a vault door and assembled on the inside. Finally, if it lives in a vault, we must be sure that the cables which connect the device to the computer room are in themselves fire-proof and fail-safe under extreme heat or water pressure so that the cables do not allow the conflagration to penetrate the vault.

Finally, we must review the specs to be sure that the operating statistics it accumulates on its own operation are satisfactory for its own management, that failure rates are logged, that incident reports are prepared, and that the device can in fact be repaired using this data without taking the entire file set off-line. This says we must probe into the maintenance modes of the device and must build a software system which will allow the main computer to interrogate the device, to run (or have run) diagnostic programs, and to pinpoint the maintenance that is required. Further, the device must have features which will allow the main computer to partially disable it so the rest of it can survive.

Last but not least the precious control section of the mass storage must be thoroughly and completely understood by

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operational management, the security office, the auditors, and the Inspector General. These people have a chartered responsibility to oversee our operation. To put all of our eggs in one basket without gaining some advance assurance that the system we propose will be satisfactory would be a mistake.

I have heard that some of these items are to be left to the discretion of the contractor. Herein lies an important discussion which is not a simple by-play on words. The Agency should make its requirements known in these important areas and leave the implementation of the system up to the contractor so he can exercise his inventiveness and engineering skill. However, in the background materials I read and in the people I have talked to about the mass storage project, I did not get the feeling that our requirements have been appropriately explored, nor has the healthy intellectual debate between peers taken place to produce a sound spec.

I do not propose that we stop the mass storage effort. I merely suggest that we proceed to define our requirements clearly and succinctly before we go to contract. Some of the requirements (such as a fire-proof cabinet) may be difficult to achieve after the device is built. Others such as audit trails over access to the authority lists are well nigh impossible to add

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on unless the system is properly designed in the first place. I therefore suggest we find some person to work as an equal

STATINTL with [redacted] on the mass storage project. Hopefully the person will be well acquainted with the operational aspects of large complex electronic devices and can act as a devil's advocate to be sure that all requirements are considered and specifications are set where those requirements need to be quan-

STATINTL tized. I further suggest that [redacted] obtain copies of Product Specifications from several major manufacturers of products of similar electronic size and complexity. From these he will see how the various manufacturers attempt to specify function, size, performance, environment, maintainability, input power, and operational environment. I have had several such product specifications in my possession, but unfortunately they have all been returned to the manufacturer who had retained my services and I don't have a single copy from which I can distill a table of contents for use by the mass storage project.

If the above things are not done, we'll run the risk of installing an early mass storage device and having it around as an unusable show piece. In a time when R&D dollars are getting in short supply, it seems inappropriate to buy prematurely and then have to surplus the gear as unusable or spend extensive amounts of modification dollars getting it to operate satisfactorily in our environment.

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HOW TO TUNE AN ORGANIZATION

Frequently a major organizational problem relates to the undefined relationships between managers. In short, the department is over-administrated and undermanaged. It is a challenge to discuss this problem so that everyone is unemotional and keeps a cool head.

Attached is an analysis tool which will allow treatment of this problem in a calm manner. It is a sanitized re-type of one from an actual client situation. In that case the Computer Department had a department head, an associate department head, and a department administrator. They squabbled over who was stepping on whose toes and they were frequently in hot water because some important activity had been overlooked. I straightened out the problem as follows:

First, all four of us listed the tasks to be done separately.

Second, I edited the list and produced what appears as the right hand column of the attachment.

Third, each one of them filled out the left hand 3 columns as to who should be responsible for Action, Alternate, and Assist on each task.

Fourth, I posted all points of agreement on a clean worksheet.

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Fifth, the three of them went through the points of contention task by task. When the department head finally decided how responsibilities were to be awarded, I recorded the decision on the worksheet. (In some cases we split tasks so one had the responsibility for exercising initiative and preparing draft, whereas someone else reviewed and approved.)

Finally, I published the attachment and the related position descriptions which matched the negotiated responsibilities.

When we did this, we had a diagram of managers assignments which we could formally amend when a person developed new skills or interests, and we could assure ourselves that each manager had (or received) the training he needed to carry out his responsibilities.

STATINTL [redacted]

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Tasks for Computer Department (C. D.) Sr. Managers.

Responsibility Codes

+ = Action
* = Assistance
# = Alternate

Head	Assoc.	Adm.	Job Title
			I-DEPARTMENT RESOURCE CONTROL
	+	*	Prepare Annual Budget
+	*		Review & Solicit Approval of Budget
		+	Keep Budget Status
	+		Monitor Budget Status
+	#		Interview potential senior professionals
#	+		Interview potential junior professionals
		+	Interview potential administrators
+	*		Indoctrinate senior new hires
	+	*	Indoctrinate junior new hires
		+	Indoctrinate administrative new hires
#	+		Develop and maintain consultant contacts.
			II-DEPARTMENT TECHNICAL CONTROL
+	*	*	Review project proposals
+			Approve project proposals
+	*	*	Review plans for approved projects
+			Approve plans for approved projects
	+		Monitor status of approved projects
+	*		Hold scheduled progress reviews
+			Review draft technical reports
+	*		Review technical briefings.
			III-DEPARTMENT MANAGEMENT ACTIVITIES
+	+		Direct client contacts to support research program
+	*		Plan Dept. Activities: Technical
	+	*	Adm./Social
		+	Physical moves
	+		Monitor status of on-going activities
	*	+	Supervise department administrative services

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Head	Assoc.	Adm.	Job Title
			III-DEPARTMENT MANAGEMENT ACTIVITIES (Continued)
+			Hear and investigate complaints re. on-going activities
	+		Hear and investigate complaints re. on-going projects
	+		Hear and investigate complaints re. on-going administration
		+	Hear and investigate complaints re. physical facilities
*	+	*	Develop C. D. personnel professionally
+	*	*	Review personal contributions to projects
+	*	*	Official semi-annual salary review
+	*	*	Personal conference with employee to discuss progress
			IV-CORPORATE/PERSONNEL ACTIVITIES
+	#		Participate in on-going corporate management activities
*	+		Participate in ad hoc corporate management activities
+	#		Represent C.D. to corporation
*	+		Represent C.D. to other departments
+	+		Represent C.D. to C.D.
+	*		Represent corporation and participate in efforts of importance to the Nation (committees, advisor, consultant, reviewer, etc.)
*	+		Participate as senior individual in professional activities outside of corporation (society activities)
	*	+	Participate in community service as corporation representative.
			V-PROFESSIONAL DEVELOPMENT ACTIVITIES
+	+		Engage in development activities personally
+	+		Attend technical seminars/conferences
+	+		Directed reading in a technical specialty.

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